Contractors and Engineers Monthly

Vol. 37, No. 8 | AUGUST, 1940 | $2 a Year, 20 Cents a Copy

AUG 19 1940 LIBRARY

Highlights Of This Issue

Streamlining Our Highways
Rounded cross-section highway design has advanced well beyond the experimental stage, due to the fact that modern machines are readily adaptable to this type of grading. See page 2.

Airport Built by Contract
The rebuilding and enlarging of the Rochester, Minn., airport, including grading, the installation of a complete drainage system, aggregate production and bituminous surfacing of the runways, were done by contract. See page 2.

Batching Set-Up on Concrete Job
One of the features of a 3.987-mile concrete paving job in Indiana was the fast and effective batching set-up, the contractor taking advantage of a high railroad embankment for the location of the three batcher units. See page 7.

Concrete for Shasta
Late last month the first bucket of concrete went into Shasta Dam, main structure in the Bureau of Reclamation's Central Valley Project in California. The erection of the cableway system for handling the concrete, and the sand and gravel plant for the production of some 10,000,000 tons of aggregate, are described in this issue. See pages 16 and 17.

Maintenance Work Reorganized
In the interest of efficiency and economy, the Arizona State Highway Department has reorganized its maintenance forces, eliminating political jobs and reducing the number of sections or divisions from forty to sixteen. See page 22.

Selecting Proper Lubricants
The selection of the right type as well as a good grade of lubricant for each part of construction and maintenance equipment is essential, if the maximum in performance and the minimum in upkeep costs are to be obtained. See page 25.

IN THIS ISSUE

Aggregate Production	17
Airport Construction	2
Bituminous Paving	11
Bridge Construction	8, 12
Cartoon	4
Concrete Paving	7
County Road Work	1
Editorial	4
Equipment Maintenance	26
Grade Separations	28
Grading	1
Highway Design	2
Highway Maintenance	22
Lubrication	25
Roadside Development	2, 20
Roadside Development Awards	4
Sewer Construction	9
Shasta Dam	16, 17

The west face of the deep cut, showing the ramp on the A. B. Lynch Co. grading contract on Wis. Route 11.

Deep Highway Cut Made by Scrapers

A. B. Lynch Co. Handled 9.5-Mile Wisconsin Job In Loess and Rock with Tractor-Scraper Units

✦ DOWN in the southwest corner of Wisconsin, on State Route 11, between Hazel Green and U. S. 61, A. B. Lynch Co., of Milwaukee, Wis., has moved 400,000 yards of dirt and 100,000 yards of Galena limestone in building 9.5 miles of state highway. When completed, this new road will provide an

(Concluded on page 10)

A County Road Unit Has Special Problems In Urban Territory

(Photos on page 40)

Union County In Northern New Jersey Has a Strong Organization and Central Road Department Yard

✦ LOCATED near the geographical center of a distinctly urban territory, the Union County, N. J., Road Department Yard can still be reached in 30 minutes from any section of the 102.1 square miles of the county. The 142.5 miles of county highways are all hard surfaced and adequately supplement the 54.5 miles of state highways within its boundaries. The Central Yard is a model of efficiency but far from satisfies the county highway officials, who have plans for far-reaching major improvements to modernize the few older buildings remaining.

Central Yard

The Central Yard is located on New Jersey State Highway 28 in the Borough of Fanwood, between the highway and the main line of the Central Railroad of New Jersey. There are four main buildings. The office is a brick structure of simple but effective architecture with a 100 x 70-foot garage and repair shop, built in 1933-34 by CWA, with a 70-foot Howe truss of wood for the roof to give a floor clear of columns. There is another storage garage for eight cars by day and a similar number of trucks at night with the blacksmith shop attached, and a separate garage and paint shop and a storage building. Three steam boilers in the yard provide heat for any or all buildings with well-insulated steam lines connecting the buildings.

In the 100 x 70-foot main garage, twelve trucks can be housed, and at each stall in this and other garages the pusher snow plow for each truck is spotted in front with one mechanical jack between each pair of trucks so the plows can be mounted in a minimum of time. The floor is heavily sanded beneath the crankcase and transmission of each truck to catch oil and permits its easy and prompt removal to lessen the fire hazard.

In this garage the county makes its own rotary brooms for the two Austin-Western pick-up sweepers, using British India fiber. A Kerrick Kleaner, made by the Clayton Mfg. Co., Alhambra, Calif., is used to clean all of the trucks and it has proved particularly effective in removing asphalt from the bodies, prior to the biennial painting of all trucks.

The repair shop contains a hand-operated No. 15 Auber press, a Balcrank lubricator operated with 90 pounds air pressure and a hand lubricator. There is also an Aurora drill press, a LeBlond lathe, a Samson grinder, a Kellogg compressor for furnishing air for inflating tires and for the operation of the lubricators, a Van Dorn buffer, and also a Van Dorn portable drill press and a Black & Decker valve seater. Two mechanics and two helpers work full time in the repair shop.

A carpenter shop on the second floor of the 8-car garage is equipped with a Wallace wood lathe and a band saw, and a Walker-Turner jig saw which is used for making cut-out signs which are quite a feature of county publicity. There are also a circular saw for heavy work, two Webb electric flasher lanterns stored here for use in time of accident, and two Black & Decker Loadometers which are used for testing loads approaching the weaker bridges.

The blacksmith shop contains a good old-fashioned forge, a Black & Decker portable drill press, and a complete Oxweld welding outfit. The blacksmith at the County Yard has developed a novel method of cleaning the burners for the asphalt kettles, which, we believe, other county equipment men as well as contractors will be interested in. The burners are first heated in a forge and then by means of a special attachment on a hose are flushed out with city water.

(Continued on page 34)

DRIVING A SEWER TUNNEL IN CLAY

Mining, mucking and steel erection in the Rudisill intercepting sewer in Fort Wayne, Ind., for which Bass Engineering & Construction Co. and Frank J. Knight, Inc., were the contractors. See page 9.

"The Streamlined Highway" Product of Modern Machines

Rounded Cross Sections, Decreasing Maintenance And Preventing Snow Drifts, Now Feasible

By GEORGE B. GORDON, Associate Landscape Architect, Public Roads Administration

✦ THE average motorist traveling a modern highway seldom thinks of the many kinds of coordinated technical science which have been combined to make the road possible. The engineers who developed sources of the raw materials which are in the road and its structures; the metallurgist and chemical engineer who transformed these raw materials into the finished metals and surfacing materials; the architect who aided in designing bridges and other structures; the designer and manufacturer of the equipment used in construction; these were only a few of the men who cooperated with the highway engineer and the contractor before the road was ready for traffic. Today's modern highway is a living demonstration of the well-integrated cooperation of many technicians without which neither a highway nor a modern civilization can be built.

But the motorist, like the rest of us these days, is in a hurry. If this new highway is safe and convenient for high-speed travel, he thinks of only one thing more, that the finished road and roadside have good appearance. The designers of the automobile in which he rides have taught the driver that *unless a product is well finished in appearance it may not have the built-in convenience, stamina, and freedom from maintenance worries that modern use requires.*

Rounded Highway Cross Section

What we have called roadside development is an effort by the highway engineer and the landscape engineer to meet this public demand for good finished appearance, which is the hallmark of good original highway location, well-considered design, and satisfactory performance. A series of demonstration projects have been set up in all regions of the country during the last six years. The best of these "experiments in the outdoor highway laboratory" have had one objective in common, *the development of an improved rounded cross section to fit varying conditions of soil, topography and climate.* As a rounded cross section is evolved to meet certain soil and topographic conditions at the lowest cost which will provide a stable slope and adequate control of erosion, the new section tends to be adopted as a standard cross section for later regular highway construction.

The evolution of a modern rounded highway cross section from the old railroad cut-and-fill section, with its sharp-angled V-ditches and unnatural plane-surfaced cut-and-fill slopes, has only begun. But already in the western plains region and along the low rolling topography of the Atlantic coast, a rounded cross section evolved for that type of topography may frequently be seen on the newer highways. This cross section features broad rounded gutters, well-flattened and rounded backslopes, and shoulder slopes which are rarely steeper than 1 on 4, and on which therefore no guard rail is needed.

In the hill country of New England and in the foothills of the Rocky Mountains, south to the Mexican border, a rounded cross section which is becoming standard is an adaptation of the plains country cross section with steeper slopes, as required by the rougher topography, and more extended cut and fill. In rough hill and mountain country in the northeast and along the Pacific coast, the highway design engineer is developing a cross section which makes the best of the even more abrupt backslopes, which cannot be avoided here, by rounding these slopes smoothly into the steep hills or mountain sides behind them.

Public Roads Administration Photo

A modern rounded cross section in Colorado. Finished with motor graders, these rounded backslopes will help prevent snowdrifts forming on the roadway. Note the snow fence on the left. Experience indicates that even in semi-arid regions of the West, native low growth soon comes in on well-rounded slopes like this.

Too many of the railroad cross sections of the past were designed to fit a narrow right-of-way, without thought as to the stability of the slope resulting when a steep 1 on 1 cut is made, as, for example, in loose sand or wet soft clay soils. The motto of the construction engineer in these good old days was "let the maintenance engineer worry about slides and erosion of backslopes—I'll be out of here."

A rounded cross section is being developed to fit each type of soil and topography with the objective of producing a stable surface on which vegetation will soon become established, either by natural seeding in very dry regions or by rough seeding or sodding methods where climate and rainfall favor such operations. Such vegetation will control erosion, and erosion on shoulders, slopes, and in gutter areas has in the past accounted for substantial annual maintenance costs.

Modern Equipment Aids Work

It is now being demonstrated in many regions that the modern rounded cross section can be produced on a mass production basis by motor-operated equipment. The hand methods which have heretofore made it impracticable, from an economic standpoint, to incorporate rounded slope grading into all regular construction contract work are now largely being replaced by the use of power scrapers and draglines. Many fine roadside development demonstrations in the past were, to be sure, performed by hand-labor methods in rounding sharp-angled plane-surfaced backslopes. But as long as the rounding had to be a hand-labor proposition on the small scale of limited roadside development projects, highway engineers continued to build highways with the obsolete railroad cross section. It must be recognized also that in some cases proper rounding and flattening of backslopes has been impossible because of the lack of necessary right-of-way or grading easements.

Contractors and engineers will continue to learn from the experience of future contracts regarding the limits within which each type of excavation equipment can best be operated. But we can here consider a few of the advantages under present methods of each general type of equipment now being used in finish-grading highways to the rounded cross section.

Shovels and Draglines

Power shovels and draglines will probably continue to be used in grading under rough rocky conditions and moun-

(*Continued on page 14*)

Rochester Airport Rebuilt by Contract

Asphalt-Surfaced Runways, New Drainage System and New Buildings Improve Minnesota Field

By HOWARD V. PEHRSON

(*Photos on page 40*)

✦ AN airport reconstruction program, in which asphalt-surfaced runways are replacing grass runways on the site of a former duck pond, is providing the world-famous medical center of Rochester, Minn., with the third largest airport on the Northwest Airlines run between Chicago and Seattle. This reconstruction program, which gives the city one of the most modern airports in the United States, totals well over half a million dollars. Remarkable at a time when most airport construction projects result from a Federal contribution of some sort, the entire program at Rochester has been financed by private funds, and all work has been done under contract by private contractors.

Rochester is a progressive southern Minnesota city of over 26,000 population. Visited by five Northwest airliners every day as well as an increasing number of privately owned air craft, the old airport had become obsolete. In the summer of 1939, the Rochester Airport Co. decided to replace its typically small-town facilities with an airport of the most modern design, construction, and equipment. Ellerbe & Co., Engineers of St. Paul and Rochester, was engaged to draw plans and specifications for the reconstruction program.

Now in its final stages, the program has included almost every type of construction. The field, at one time a duck pond, has been drained, widened, leveled and graded; old grass runways have been replaced with four 3,500-foot asphalt-surfaced runways; a new passenger depot has been constructed; a complete airport lighting system and two-way radio system have been installed; and a modern control tower will be erected during the summer. The new runways are each 150 feet wide and consist of two diagonal NW-SE and NE-SW courses and two other courses running N-S and E-W.

Problem of Drainage

It was essential that complete drainage be assured at this site of a former

(*Concluded on page 37*)

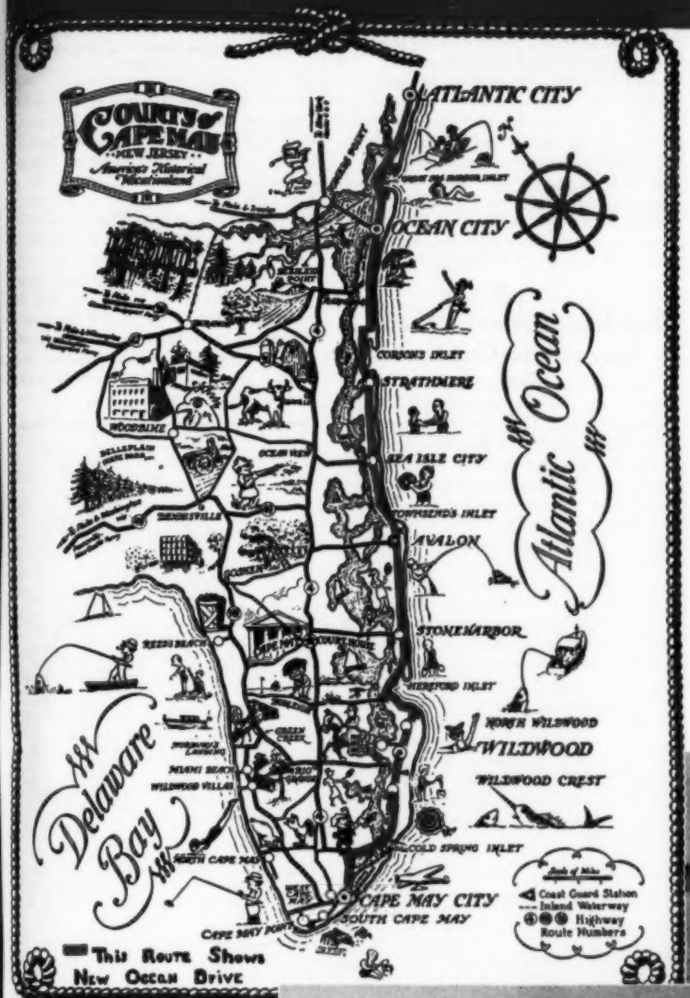
California Division of Highways Photo

A tractor and scraper rounding a scarified slope along a California highway. Under these soil conditions, if added right-of-way easement could have been secured, the slopes might have been flattened to about 1 on 2 instead of the present 1 on 1, before rounding was done.

A Bros pneumatic-tired roller was used to compact the crushed-rock base for the Rochester airport runways.

A 30 YEAR DREAM REALIZED

JERSEY COAST RESORTS NOW LINKED BY 40 MILE OCEAN DRIVE



Courtesy of Cape May County Times

A 40-mile continuous highway, always within sight and sound of the ocean, now links the ten popular New Jersey coastal resorts from Atlantic City to Cape May. For 30 years, Cape May County has visualized such a highway. And the realization of that vision this year called for an expenditure of $1,700,000 and the construction of six bridges.

TEXACO Asphaltic Concrete paving predominates on the Ocean Drive. Half the entire length of the pleasant, scenic highway has been paved with this resilient, skidproof type of construction, representing two-thirds of the Drive's hard-surfaced mileage.

Cape May County officials estimate that the ten resorts served by the Ocean Drive will draw hundreds of thousands of motorists annually. The choice of TEXACO Asphaltic Concrete for the leading role in serving this intensive traffic is one more tribute to the durable, easy-riding qualities of this type of paving.

Half the 40-mile-long Ocean Drive, or two-thirds of the hard-surfaced portion, is paved with TEXACO Asphaltic Concrete.

New Jersey officials dedicated the newly completed Ocean Drive on June 13th.

Close-up of the skidproof, resilient TEXACO Asphaltic Concrete surface.

TEXACO ASPHALT

THE TEXAS COMPANY, Asphalt Sales Department,
135 East 42nd Street, New York City

Chicago
Kansas City
Houston
Jacksonville

TEXACO

Buffalo
Philadelphia
Richmond
Boston

Contractors and Engineers Monthly

THE NATIONAL BUSINESS PAPER OF THE CONSTRUCTION INDUSTRY

Member of Controlled Circulation Audit

Issued Monthly by Buttenheim-Dix Publishing Corp.
Editorial and Business Office: 470 Fourth Ave., New York City
Printed in Mount Morris, Ill., U. S. A.

THEODORE REED KENDALL, Editor

EDGAR J. BUTTENHEIM.....President — O. E. POTTER.....Managing Editor
GEORGE S. CONOVER.....Vice President — MYRON Mac.LEOD.....Advertising Manager
DONALD V. BUTTENHEIM.....General Manager — HERBERT K. SAXE.....Treasurer

BRANCH OFFICES
Chicago, Ill., Daily News Bldg., George S. Conover, Vice President; John T. Dix
San Francisco, Calif., Mills Bldg., Duncan A. Scott

Copyright 1940 by Buttenheim-Dix Publishing Corp.

Defense Highways Are Urgent Need

Although the War Department has made a study of our highways in regard to their use in war time and has stated that highways adequate for present-day normal traffic would be satisfactory for military purposes, the Public Roads Administration has made a report which shows conclusively that our present highway system is entirely *inadequate* for our present-day traffic.

According to the P.R.A. report, an inter-regional system of highways of 27,000 miles is needed to meet present-day traffic demands. The statement has also been made that in a national emergency our highway system would be hopelessly entangled in 24 hours. If this seems a shock to our national pride which has boasted of our superior American highways, just participate in any summer week-end exodus from one of our large metropolitan areas and then try to imagine what it would be like if the entire civilian population were being evacuated, and at the same time troops and mechanized equipment were being moved over the same routes.

As yet, no specific legislation has been enacted to get under way a program to meet our highway needs. If it is to be done under the Federal-Aid Act, it will take from 20 to 40 years to complete. It's hardly necessary to point out that we can't wait that long. Among the many items included in our extensive national defense program is the increase in numbers and full mechanization of the army. In addition, the defense program calls for the manufacture of all types of war material, and in order to make our army effective it must have the necessary supplies. Our present highway system can not efficiently handle this additional burden and *must* be supplemented in order to meet the demands that will be made upon it, according to the A. R. B. A.

Well-constructed highways, capable of carrying the weight of heavy motorized army equipment, are not mushrooms which spring up over night. With the best and latest equipment and the best and most efficient organization, the construction of highways is a comparatively slow job. An interesting example of this lies in the paving record set a few weeks ago on the Pennsylvania Turnpike. There in one week 17 miles of four-lane concrete pavement was laid by some twenty-odd contractors. Even taking into consideration that this is a super-highway, wider perhaps than some which must be built to provide adequate highway facilities, there still won't be time to build the 27,000 miles of highway and the 22,000 new bridges needed immediately after the army is given the order to "March" and the enemy is at our gates.

We are wholeheartedly and fervently in favor of all rational measures of defense preparations, and in speeding up those preparations with the minimum of red tape and the maximum of efficiency. We also believe equally wholeheartedly that democracy and the American way of doing things are not incompatible with efficiency. But we *are* opposed to hasty ill-advised plunging into vast expenditures before a plan of action has been carefully worked out.

As far as our highways are concerned, a plan of action is already in existence, worked out sanely and rationally before this country fell into the grip of panic and patriotic fervor. This plan, based on highway planning surveys and worked out jointly by the P.R.A. and the state highway departments, awaits only the funds to give it the green light. To this Congress must give some attention.

The Hon. Karl Stefan of Nebraska stated in a speech in the House of Representatives on May 28, "In planning national defense here in America we can not eliminate the importance of roads which lead to the doors of our nation's source of food and raw materials." This means that highways must contribute not only to defense but to the preparations for defense. Consequently the need for adequate highways is urgent. In order to achieve complete national defense, an appropriation for defense highways must be provided at once. Then we can start on a tremendous highway and bridge construction program, carried out under contract, which will provide this country as quickly as possible with the necessary network of highways without which the defense of this vast country is impossible.

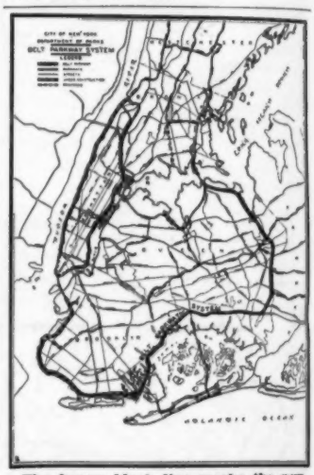
Roadside Development Awards to Contractors

Highway contractors and their superintendents who are interested in competing for the 1940 CONTRACTORS AND ENGINEERS MONTHLY Roadside Development Awards can greatly aid the state highway department engineers who make the nominations for the Awards by furnishing them with the details of their work, job photos and other data.

These Awards are made to highway contractors and their superintendents in recognition of their contribution to roadside development on any type of highway project under way during the 1940 construction season where any basic roadside-development work is done. State highway department engineers are desirous that all contractors whose work merits recognition should be nominated, but the collection of all the necessary data from various jobs widely scattered over the state is a large task. Cooperation on the part of contractors themselves in discussing the matter of nominations with the resident engineer on the project, and furnishing him with the necessary information to send in to the main office of the state highway department, will greatly aid not only the state highway department engineers in making the nominations, but also in insuring that meritorious work does not go unrecognized.

Five Awards are made each year, a Section Award in each of the four sections of the country, and the National Award, given to one of the Section Award winners, for the greatest contribution to roadside development throughout the United States.

"You shoulda seen the job that got away!"



The heavy black line marks the new Belt Parkway in New York City. See page 38.

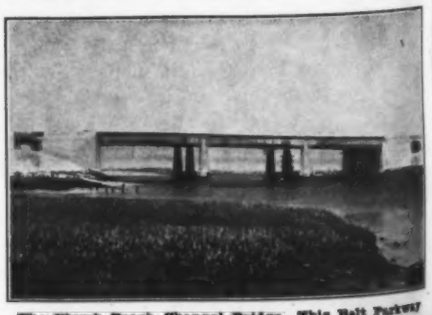
VIEWS OF NEW YORK CITY'S NEWEST PARKWAY

Fairchild Aerial Survey Photo
Aerial View of the Belt and Grand Central Parkways near Ardmore, L.I.

The Bronx-Whitestone intersection bridge at the junction of the Belt Parkway and Bronx-Whitestone Parkway.

Fresh Creek Bridge, one of the six structures carrying the Belt Parkway over waterways, and in the background the Long Island Railroad overpass.

Looking north at Crocheron Park pedestrian overpass, constructed over the Belt Parkway and leading from the park to the shore front.



The Plumb Beach Channel Bridge. This Belt Parkway was financed by $16,000,000 of New York City funds and a $12,000,000 Federal grant.

Roads for Defense Convention Theme

"Roads for Defense" will be the theme of the 1941 convention of the American Road Builders' Association which will be held in New York City, January 27-30, 1941. Outstanding military authorities and representatives of the War Department will participate in an open forum on military roads during the four-day conclave. The role of highways in America's preparedness program, and the changes needed to make the nation's highway system meet the demands of modern warfare will be emphasized at convention sessions.

Convention headquarters will be at the Pennsylvania Hotel and the annual banquet will be held at the Waldorf-Astoria Hotel on January 29. Included in the activities planned for the engineers, public officials and road builders who will attend the convention are inspection trips to the newest construction projects in the New York metropolitan area, as well as similar trips arranged by the New Jersey State Highway Department. A special trip to LaGuardia Airport will be one of the highlights.

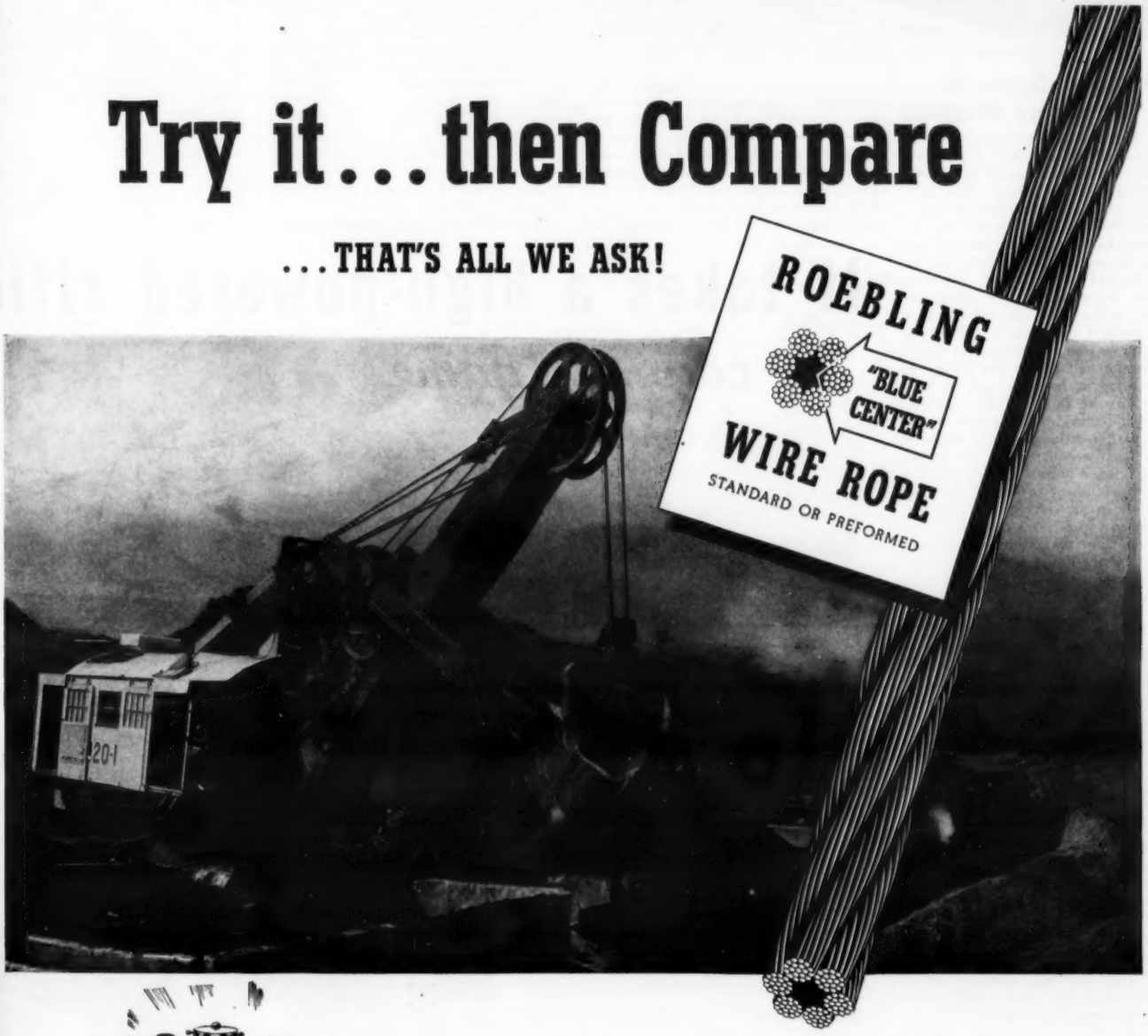
Spray Painting Equipment

A hand book, called The ABC of Spray Painting Equipment, describing all types of spray painting equipment and explaining their functions is issued by The DeVilbiss Co., Toledo, Ohio. The subjects treated are: the paint spray gun, its troubles, remedies and accessories; material containers; hose and hose connections; air transformers and condensers; and air compressing outfits. Added information is found in the frequent illustrations and diagrams.

Copies of The ABC of Spray Painting Equipment may be secured by interested contractors and state and county highway equipment engineers direct from The DeVilbiss Co. by mentioning this item, or from CONTRACTORS AND ENGINEERS MONTHLY.

Try it...then Compare

...THAT'S ALL WE ASK!



YEARS OF RESEARCH DEVELOPED "BLUE CENTER"

Years of research have gone into the development of Roebling "Blue Center" Wire Rope.

Furthermore, the development and improvement of Roebling "Blue Center" is a never-ending process. A planned program of research is carried on ceaselessly in the Roebling Research Laboratory—one of America's most modern and completely equipped research units.

WE INVITE YOU to put Roebling "Blue Center" Wire Rope to the severest service test you know of—on any of your rope-rigged equipment. We will stand by the results. We say this without hesitation—for we know the capabilities of "Blue Center" on a wide variety of equipment, under severest operating conditions.

Keep in mind that nearly 100 years of Roebling wire fabricating experience have gone into the development of Roebling "Blue Center" Wire Rope. It is Roebling's highest achievement in wire rope manufacture. Specially developed through years of research, to provide maximum rope durability, safety and economy—Roebling "Blue Center" has established unexcelled records for long, low-cost service.

Try this rope on your shovels, scrapers, cranes, or other rope-rigged equipment. Keep accurate service records. Compare. We are confident you will agree with other users—that Roebling "Blue Center" assures lowest rope replacement cost.

JOHN A. ROEBLING'S SONS CO.
Trenton, N.J. Branches in Principal Cities

ROEBLING "BLUE CENTER" The Finest of all Roebling Wire Ropes

The new Shunk D-K spreader and finishing machine.

New Model Spreader, Finishing Machine

One of the advantages claimed for the new power-driven model of the D-K spreader and finishing machine recently announced by the Shunk Mfg. Co., Bucyrus, Ohio, is its ability to lay a smoothly finished mat of surfacing material over badly worn and rutted roads, without the need of preliminary scarifying of the old surface or any filling in of holes. Since the machine rides over the new surface on two crawler-type wheels located immediately behind the oscillating finishing screed and equipped with smooth belt treads, the bumps in the old road surface are said to have little or no effect on the finished surface.

Another feature of the design of this machine is the adjustment for height of the two front wheels. Either wheel may be set to run at a level above or below the opposite wheel to compensate for differences in the subgrade or old surface. Extra wheels are supplied for use in transporting the machine from one job to another. Power for this spreader and finishing machine is supplied by a 4-cylinder water-cooled industrial-type motor, with drive through a truck-type transmission and separate reverse which provides five speeds both forward and reverse. Two of the three wheels in each crawler unit are driven through a truck-type differential. It is stated that there is ample power for operating on any grade.

Further information on this new D-K spreader and finishing machine, which will spread 1,000 to 1,200 tons of hot or cold-mix material a day, may be secured by those interested direct from the manufacturer by mentioning this magazine.

New Easily Operated Blue Print Machine

The new Pease Model 9 arc-lamp continuous blue printing machine has a printing-speed range from 5 inches to 6 feet per minute. The framework is of all-welded steel construction with a seamless tubular steel drive roll and brass idler rolls, and it is powered by a ¼-hp variable-speed drive motor.

Tracings and sensitized paper or cloth in cut sheets up to 42 inches in width are easily fed into the front of the machine over the 9-inch wide heavy-gage reinforced-steel feed board, then onto a heavy seamless revolving band which carries them upward, around and through the machine in close contact with a segment of Trans-Peco contact glass through which the exposure takes place. After exposure, both the tracings and prints are returned into a tray at the front of the machine. Adequate ventilation for the contact glass is provided by an 8-inch fan located inside the printer housing at the left. Regulation of possible side travel of the front band roll is secured through a special vernier adjustment operated by a hand dial. Also the tension of the contact band can be released, when desired, by a foot pedal. Two paper rod positions are provided, each rod accommodating 100 yards of paper.

The four specially designed arc lamps of the actinic type burn from 45 minutes to an hour without breaking the arc, and also operate steadily from 10 to 12 hours on one carbon trim.

Form No. 2536 containing further information on the new Pease Model 9 blue print machine may be secured by state and county highway engineers and contractors direct from the C. F. Pease Co., 2601 W. Irving Park Road, Chicago, Ill., by mentioning this item.

Industrial Clutches And Power Take-Offs

Featured by unusual simplicity and rugged construction developed through many years of clutch-building experience, Rockford industrial clutches and power take-offs, made by the Rockford Drilling Machine Div., Borg-Warner Corp., Rockford, Ill., are especially built for controlling heavy-duty drives from internal combustion engines and have many uses in road-building and contruction equipment requiring flexible power transmission control on main or auxiliary drives. Typical applications include tractors, graders, compressors, pavers, mixers and mixing plants, shovels, cranes, material handling equipment, bituminous distributors, rollers and similar units.

Rockford over-center clutches, which lock in or out of engagement until the operator changes the position of the control lever or pedal, are made with single or double drive plates, for operation in oil or dry, in many standard sizes ranging from 6 to 20 inches in diameter, for transmitting from 2 to 80 hp at 100 rpm. Rockford spring-loaded clutches, which operate like an automobile clutch, are also made with single or double drive plates, for operation in oil or dry, in sizes from 8 to 20 inches in diameter, for transmitting from 2 to 60 hp at 100 rpm.

The power take-offs, built in a complete range of sizes to fit standard S.A.E. flywheel housings, are available with either over-center or spring-loaded clutches, for use on independent power units or built-in engines for powered equipment.

Further details on capacities, dimensions and operation of these Rockford industrial clutches and power take-offs may be secured by those interested direct from the manufacturer by mentioning this item.

It takes a high-powered rifle

to bag big game

IF YOU'RE stalking moose, you need more striking power than you can get from a target rifle. And if you're stalking heavy snowdrifts, scraping unimproved roads after a rainstorm, excavating for road construction, or hauling ballast over a bad road, you need something better than a rear-drive or ordinary four-wheel drive truck. In fact, only WALTER FOUR-POINT POSITIVE DRIVE will always deliver power to the right places at the right times. Ask us about Walter Automatic Lock Differentials, Suspended Double Reduction Drive and other distinctive features that put Walter Tractor Trucks in a class by themselves.

WALTER MOTOR TRUCK CO.

Fine Batcher Set-Up For Indiana Highway

Bontrager Construction Co. Has Excellent Organization For Paving Relocation of U.S. 30 at Valparaiso, Ind.

(*Photo on page 40*)

✦ TAKING advantage of a high railroad embankment, Bontrager Construction Co. of Elkhart, Ind., devised a fast and effective batching set-up for its 3.987-mile reinforced-concrete paving contract for two 22-foot divided lanes on the relocation of U. S. 30 south of Valparaiso, Ind. With three batching units, bulk cement, crushed stone, and one double plant for gravel and sand, so arranged that the trucks could drive through the first two plants, the long haul was offset somewhat by the speed of batching. At times a truck was under each batcher getting the loads out under a fast headway.

Out on the grade the same thought was given to making the most of every move, from sprinkling the grade to keep down the dust to using two pavers running on the shoulder to make every move a forward one. This outfit worked only one 8-hour shift a day and poured from 1,600 to 1,800 feet of 22-foot 9-7-9-inch section pavement each day, requiring 13.166 cubic feet of concrete per foot of pavement.

Running the Batchers

The Pennsylvania Railroad tracks through Valparaiso are raised considerably above the elevation of the ground on the south side of the tracks, and in fact this condition led to the construction of an underpass on the new location of U. S. 30 at the east end of the Bontrager contract. Advantage was taken of this elevation of the delivery of materials by placing the batching plants at ground elevation below the tracks and either running the materials down by gravity to where they could be handled easily by cranes or using the spiral feed of the bulk cement plant overhead instead of at ground level and then raising the cement with a bucket elevator to the bin. The Butler bulk-cement plant took delivery direct into the spiral feed and then straight to the top of the bin which was slightly above track elevation.

The trucks on entering the batching area drove to the right, stopped and reset the cement carriers for each batch, and then drove under the batching plant and received the two batches. The cement carriers which kept the cement away from the aggregates during hauling, in accordance with state specifications, were ingenious metal boxes swung on pipe axles set into the sides of the truck bodies. The carriers proper were merely metal boxes which swung under a metal lid, one section of which at the center lifted for the entry of the cement into the box. The swinging section latched with a bar which was hinged at four places and was held down in the locked position by a spring latch. The carriers were set in locked upright position and the center lid opened for the cement before the truck entered the bulk-cement batching plant. Then on pulling out, the lids were closed and the cement was protected from any moisture from the aggregates during loading or hauling. At the pavers the dump men unlatched the carriers and, although they were supposed to swing over when the load was dumped anyway, they always tipped the can and spread the cement on the batch just before the truck dumped the batch. This was good insurance against any delay.

From the cement batcher the run to the second batcher, another Butler outfit but this time for crushed stone, was a distance of about 200 feet. Here the truck ran under the batcher, thus saving the time usually required for backing under. The aggregate was delivered in hopper-bottom cars and dumped at track level into a track hopper with a chute to a pit at the bottom of the embankment from which a Northwest crane with a 40-foot boom and a ¾-yard Kiesler

(*Continued on page 30*)

C. & E. M. Photo

Not a hobby horse, but a simple effective method of vibrating two sides of an expansion joint simultaneously so as not to disturb the joint, just ahead of the final pass of the finishing machine.

WALKER BAR
No Drip!
★ FULL CIRCULATING SPRAY BAR for ALL ★
BITUMINOUS DISTRIBUTORS
Easy to Install
WRITE FOR CIRCULARS
THE EARL WALKER CO. INC
SULLIVAN, ILLINOIS

More yardage each hour

when you use Bethlehem road steel

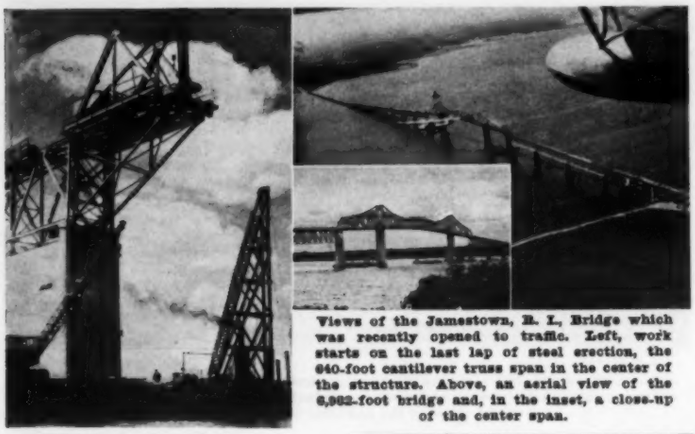
Whether it's a small contract or a large job like the new Pennsylvania Turnpike, you'll find that using Bethlehem Road Steel enables you to finish more yardage per hour.

Bethlehem road steel materials are specifically designed to save your time and increase your profits. Bethlehem Road Joints, for instance, are one-piece units, easily installed by one or two men working ahead of the pouring crew. Bethlehem Bar Mats and Reinforcing Bars are delivered to you promptly, cut to the dimensions needed on your job. Bethlehem Highway Guard, Cable Brackets and Steel Posts are easy and economical to drive and string.

You'll find, too, that it saves you time and money when you make Bethlehem your headquarters for road steel. A single order placed with Bethlehem eliminates unnecessary bookkeeping, telephoning and correspondence.

For higher profits and more yardage completed each hour on your next contract, get Bethlehem Road Steel Service to supply you with all the road steel materials you need.

BETHLEHEM STEEL COMPANY



Views of the Jamestown, R. I., Bridge which was recently opened to traffic. Left, work starts on the last lap of steel erection, the 640-foot cantilever truss span in the center of the structure. Above, an aerial view of the 6,982-foot bridge and, in the inset, a close-up of the center span.

New Bridge Joins Island to Mainland

The $3,000,000 1¼-mile Jamestown Bridge, linking Conanicut Island in Narragansett Bay to the Rhode Island mainland, was opened to traffic on July 27 and officially dedicated early this month. Started in March, 1939, this bridge replaces what is said to be the oldest public transportation facility in continuous operation in this country, for the Jamestown-Saunderstown ferry which it supplants was founded in 1675.

The bridge extends across the west passage of the bay, connecting the western shore of the Bay near Saunderstown with the town of Jamestown on Conanicut Island, the distance from shore to shore being 6,600 feet. The deep water channel near the island is spanned by a cantilever truss with a main span of 640 feet and a vertical clearance of 135 feet above mean high water. This is flanked on either side by an anchor arm 256 feet long and three 270-foot deck truss spans. On the eastern end a steel girder trestle 750 feet long connects the third deck truss span with the abutment on the island, while on the western end steel girder spans totaling 1,500 feet extend from the span to a point about 2,000 feet from the shore. From this point steel stringers on concrete pile bents carry the roadway to the shore. The bridge has a reinforced concrete roadway 22 feet wide between curbs, with a 3-foot concrete sidewalk on one side. The roadway on the main cantilever span is of the open steel type.

Merritt Chapman & Scott Corp. was the contractor for the substructure, consisting of concrete pile bents, piers and abutments; the Harris Structural Steel Co. of New York had the contract for the superstructure; Lipset-Jung Co. of Brooklyn, N. Y., was subcontractor for the concrete deck, and Parsons, Klapp, Brinckerhoff & Douglas of New York City were the designing and consulting engineers. The Jamestown Bridge was built by the Jamestown Bridge Commission and was financed by a PWA grant of $1,404,000 and a bond issue of $1,700,000 sold by the Commission.

Cutler-Hammer Moves Its Pittsburgh Office

Cutler-Hammer, Inc., of Milwaukee, Wis., manufacturer of electric motor control, safety switches and allied electrical equipment, has moved its Pittsburgh office to new and larger quarters in the Park Building, 355 Fifth Avenue. T. S. Towle is Manager of this district.

New Sixth Edition Of Welding Handbook

The sixth edition of "Procedure Handbook of Arc Welding Design and Practice," recently published by the Lincoln Electric Co., contains 1,125 pages and a total of 1,557 illustrations, including photographs and drawings. The Handbook is reissued to include all new data essential for the most efficient use of arc welding in all its varied applications and contains the results of two years of fact finding by a staff of 200 arc-welding application engineers in contact with every industry throughout the world.

Written particularly for use by designers, engineers, production managers, welding supervisors and operators, the Handbook contains a wealth of data for contractors, engineers, steel erectors and fabricators, equipment maintenance men, and welders, and aims to keep all those who use welding in any way whatever abreast of the fast-growing field of welding development.

The eight sections of the book cover the following subjects: welding methods and equipment; technique of welding; procedures, speeds and costs for welding mild steel; structure and properties of weld metal; weldability of metals; designing for arc-welded steel construction of machinery; designing for arc-welded structures; and typical applications of arc welding in manufacturing, construction and maintenance.

Copies of this welding handbook, bound in dark blue semi-flexible simulated leather, may be secured from the Lincoln Electric Co., Cleveland, Ohio, or from this magazine. Price, post paid, $1.50 in the United States; $2.00 outside the U.S.A.

Pumpcrete Sales Engr. Moves

R. T. Sherrod, previously located in the home office of the Chain Belt Co., Milwaukee, Wis., as Pumpcrete Sales Engineer, has been transferred to New York City where he will act in the same capacity for the Metropolitan area.

WHEN THE CALENDAR SAYS:
"STEP ON IT"
GEAR UP WITH A
"99"

"99" Finisher Blade, elevated to trim down high bank.

On operations of this type the "99" Loader picks up and delivers 75 to 100 cubic yards an hour into trucks.

● At any season, the "99" is the most useful power grader made. But its ability to handle so many more kinds of work so much better and faster is especially valuable when the calendar warns that approaching Winter calls for quick completion of many operations.

The distinctive power, traction and maneuverability made possible by the "99's" ALL-WHEEL DRIVE AND STEER enables you to swing it into one operation after another in a manner that makes every minute count. And when Winter puts other equipment in the storage yard, the "99" can be hired out for snow plowing. It can't be matched for speed, efficiency and ability to drive through big drifts on both curves and straightaways.

The multiplex advantages of the "99" as a power grader have been expanded to many operations usually requiring special machines by the development of special attachments. With this power grader you can skin off sod and load it into trucks, pick up excess dirt on shoulders or between forms faster and cheaper. It will take heavier cuts from banks or slopes, do a cleaner job on shoulders, bulldoze heavier loads; scarify with lighter draft and get better disintegration.

See a "99" at work. Learn what its power, ability and economy can mean to you every month of the year for many years. THE AUSTIN-WESTERN ROAD MACHINERY CO., Aurora, Illinois.

Motor Graders
Loaders
Blade Graders
Elevating Graders
Hydraulic Scrapers
Crushing and Screening Plants
Cable Scrapers
Rollers
Roll-A-Planes
Motor Sweepers
Bituminous Distributors
Shovels and Cranes

Austin-Western

1869 Penco CORRUGATED METAL CULVERTS

Easily installed—no delay and no maintenance. Guaranteed to meet U. S. and State Highway Specifications.
Durable . . Permanent Low Cost
Phone or write
PENN METAL CORPORATION OF PENNA.
Oregon Avenue & Swanson Street, Philadelphia, Pa.

Intercepting Sewer Of Horseshoe Section

Ft. Wayne Builds Rudisill Interceptor Nearly 2 Miles Long in Tunnel with Part Driven in Compressed Air

(*Photo on page 1*)

+ THE section of the Rudisill intercepting sewer in Fort Wayne, Ind., extending for 9,843 feet and started early in January, 1939, was completed in October, 1939, at a cost of approximately $800,000, as part of the comprehensive sewerage program to improve the condition of the St. Joseph and St. Marys Rivers which join within city limits to form the Maumee River. Relief of existing sewers in several districts with greater available storm flow capacities will also reduce flooding of property during heavy rains. Included also in the program is the construction of an activated-sludge sewage treatment plant.

The Rudisill interceptor was built by Bass Engineering & Construction Co. and Frank J. Knight, Inc. of Detroit, Mich., from three shafts, the one described at Hoagland Avenue and W. Rudisill Boulevard about 4,800 feet from the west end of the contract, a second 3,000 feet from the north end at Oxford and Smith Streets, and a third shaft close to the north end. Not far from the second shaft and to the south the sewer makes a bend changing from a west to easterly direction to south to north.

Only at the Hoagland shaft was work under air necessary and there for less than 1,000 feet and under only 6 pounds pressure. Most of the tunnel is through clay with some gravel with the clay and a few sand pockets. The tunnel section is horseshoe in shape, varying from a 6-foot 6-inch horizontal and vertical dimension to a maximum 10-foot 6-inch section at which the invert is 15¾ inches thick and the crown of the arch 10½ inches thick. The quantities for the maximum section were 4.8 cubic yards of excavation per running foot of sewer tunnel, 1.602 cubic yards of concrete and 90.6 pounds of steel. The lower 600 feet of the tunnel on this contract had but 6 feet of cover but the average for the remainder of the length was about 30 feet and for its entire length the tunnel was driven under city streets.

The Hoagland Avenue Shaft

The Hoagland Avenue shaft was excavated 14 feet wide x 16 feet long and to a depth of 46 feet with wood sheeting placed as the excavation proceeded with no driving. Wood lumber from 8 to 12 inches wide and all 2 inches thick was used with 12 x 12-inch wales spaced 6 feet center to center at the top down to 3 feet at the bottom. The posts at the corners were all 8 x 8-inch timber. Two 6-inch pipes in the southwest corner of the shaft carried the 100-pound high-pressure air for the clay spades and for operating the pneumatic placer for the concrete, and the 9-pound low-pressure air for the work when the tunnel was worked under air. In the same corner were a 2-inch water line for the grouting operations and a 2-inch electric conduit and at the opposite southeast corner was the 2½-inch pump discharge line.

Centered at the north side of the shaft was a 10-inch steel pipe for chuting the concrete for the first portion of the invert, before the concrete was delivered through pipes in the manholes. The pipe delivered the material into a 2-yard hopper from which it was drawn directly into the industrial-railway dump-body cars for delivery ahead.

The center section of the shaft, 14 x 5-feet 6 inches, was timbered off with hard wood as a hoistway for the muck. The Koppel car bodies were lifted from the trucks for dumping at the top. A well-built stairway with a substantial smooth hand-rail was built in the south side of the shaft for the men working in the tunnel. It was covered to protect the men using it from falling muck from above and also from rain and snow. All men working in the tunnel were required to wear hard hats and safety shoes.

Utilities in Tunnel

Immediately beneath the lowest flight of stairs in the shaft was an electric sump pump for drainage of the section nearest the shaft in both east and west directions. Near the west heading a Cameron air-operated sump pump was in action to care for water entering through the heading.

The industrial railway track for the muck cars was double track in the shaft to permit the hoisting of the loaded cars and for a train of empties ready for the Whitcomb locomotives to run forward to the headings in either direction. A single track ran through the air lock for the west tunnel and the track was continued single all the way to the face except for sidings every 200 feet. The muck cars were run in 4-car trains.

C. & E. M. Photo
The Hoagland Avenue and W. Rudisill Boulevard shaft, showing a loaded car body being raised for dumping.

On the south side of the tunnel the

(*Continued on page 38*)

Contractors—Prevent loss of tools and other equipment with this EVERHOT Branding Iron
This inexpensive Branding Iron may also be used as a soldering iron or blow torch.
EVERHOT MFG. CO.
51 S. 19th St.
MAYWOOD, ILLINOIS

in Business for Your Safety
AMERICAN CABLE
TRU-LAY Preformed WIRE ROPE
THE TRUE STORY OF A SLOGAN—
Most slogans for business organizations are coined phrases designed to help sell either merchandise or service. Our slogan, "In Business for Your Safety," voices this company's policy; this organization's spirit.
More than thirty years ago Weed Tire Chains were put on the market to make motoring safer. Thus the American Chain and Cable Company was conceived in Safety and has always been dedicated to that ideal. Today ACCO products are to be found serving faithfully and safely in nearly every field.
Fifteen years ago we introduced preformed wire rope—American Cable TRU-LAY. We did so not only because preforming made TRU-LAY a rope of longer service but—a safer rope. TRU-LAY Preformed is safer to handle; safer to use. The heritage of safety is a tradition with American Chain and Cable men. The entire organization stands as a single unit behind the true meaning of "In Business for Your Safety."
GREEN SIGNIFIES SAFETY
BUY ACCO QUALITY whether it is American Cable Wire Rope and Slings—American Chains (Weed Tire Chains, Welded and Weldless Chains)—Campbell Abrasive Cutting Machines—Ford Chain Blocks—Page Wire Fence—Page Welding Wire—Page Traffic Tape—Reading-Pratt & Cady Valves—or any other of the 137 ACCO Quality Products.
AMERICAN CABLE DIVISION • WILKES-BARRE, PENNSYLVANIA
District Offices: Atlanta, Chicago, Detroit, Denver, Los Angeles, New York, Philadelphia, Pittsburgh, Houston, San Francisco
AMERICAN CHAIN & CABLE COMPANY, INC.

Tractor-Scraper Units Move Loess and Rock

(*Continued from page* 1)

improved alignment straight through from Dubuque, Iowa, to Racine, Wis. The new 9.5-mile section is practically straight through rolling country and parallels the Illinois-Wisconsin line, just within the Wisconsin boundary. Dirt moving began September 21, 1939, and work will be completed by September 30, 1940.

Work Methods in the Cut

The deep cut, on the west end of the road, reached a maximum depth of 87.1 feet, and has a 1-to-1 slope on the west side down which loess and blasted rock had to be hauled. There is a creek running at the bottom, and loess sloping down the east side of the ridge. The tough rock of the cut was broken up chiefly by blasting, the holes being rather closely spaced and about 10 feet deep.

In preparing the hauling ramp, which had a 20-degree slope down the 1-to-1 base of the west side of the ridge, a D7 tractor and LeTourneau Angledozer did all of the work. The ramp was 18 feet wide and angled down from the top of the cut with two sharp turns. It had a total length of about 360 feet.

A wide gully 20 feet deep along the old road, and about 1,600 feet from the foot of the ramp, was first filled with rock and dirt from the top of the cut by four D6 tractors with LeTourneau 12-yard Carryalls. Then the alternating scraper loads of rock and dirt made the approach for a treated wood-piling bridge, which directly adjoins the cut. It is so close, in fact, that a concrete abutment for the bridge was set directly against the ledge of the ridge.

A total of 65,000 yards of solid rock and 20,000 yards of dirt was removed from this cut, through the highest ridge on the contract. The rock slopes are 1/10 to 1, or practically vertical.

The work in the big cut progressed steadily and rapidly with two 7-hour shifts a day, the tractor-scraper units averaging 1,200-foot hauls and requiring 14 minutes per round trip, and the loads averaging 7 yards for all rock, and about 9 yards on dirt. A D8 pusher tractor was used in the loess on the east side of the ridge to speed up loading when traction was none too good.

Because of working in rock, frequent equipment repairs were necessary, but these were handled quickly and cheaply with a welding outfit.

Preparing the Subgrade

The subgrade for the new road was scarified, sprinkled and rolled to a specified density with sheepsfoot tamping rollers. After the first two courses were shaped and rolled, the third course was rolled and treated with 125 tons of calcium chloride. The crushed rock for the surface, amounting to about 41,000 yards, was taken entirely from the deep cut. Just beneath the road surface, mine tailings were spread to prevent frost boils.

Personnel

The A. B. Lynch Co., Milwaukee, Wis., had the contract for all road construction, including the cut and fill, and the crushed-rock surfacing on the 9.5-mile section. The structural contract, including four bridges, two with pile abutments and concrete steel superstructures, the third with a 25-foot all-concrete span, and a fourth a twin 10 x 10 concrete box, was awarded to Luety Brothers of Beloit, Wis. A. F. Keyes was General Superintendent for Lynch, and P. H. Faherty was Resident Engineer for the Wisconsin Highway Commission on this contract.

Engineering Letters Made Uniformly Neat

For more than a decade Wrico lettering guides have been the standard of engineering lettering, making it possible for draftsmen who were not experts in engineering lettering to produce neat letters on all drawings. The Wood-Regan Instrument Co., Inc., Nutley, N. J., has recently announced the new Wricoprint lettering sets which are much less expensive than the standard line, making it possible for engineering students and all draftsmen to possess their own sets.

The new Wricoprint guides, also

A set of the new Wricoprint lettering guides.

made of Pyralin like the standard Wrico lettering guides, are available in both standard vertical and standard slant lettering in capital letters and small letters and all numerals and standard engineering and commercial symbols. Each set comes complete with the special Wrico pen, a lettering pad, guides for capitals, small letters, numerals and symbols, a bottle of Wrico pen cleaner and a bottle of Higgins Wrico waterproof India ink.

Only JAEGER Pumps Have All These Features

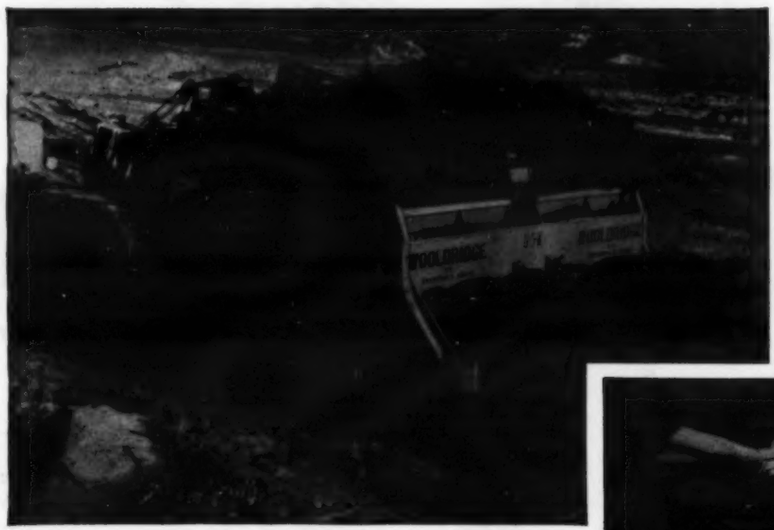
- **JAEGER PRIMING JET** — Up to 5 times faster prime and re-prime — no adjustments, no need to "gun" engine.
- **POSITIVE RECIRCULATION CUT-OFF** — controlled by flow, not pressure.
- **ACCESSIBLE SEAL** — outlasts the impeller.
- **PATENTED SELF-CLEANING SHELL.**
- **EVERY PUMP FACTORY TESTED** for high capacity and pressure.
- **COMPLETE RANGE OF SIZES, TYPES** — 3,000 to 220,000 g.p.h.

Send Today for Latest Catalog and Prices.

THE JAEGER MACHINE CO.
701 Dublin Ave., Columbus, Ohio

Bearing Protection...

Under Loads Like This!



EASIER STEERING is assured when the steering connections and wheel bearings are lubricated with *Texaco Marfak*. This lubricant protects your investment, by protecting parts *twice as long* as ordinary grease.

25 cu. yd. CARRY-ALL, built by Wooldridge Mfg. Co. at Sunnyvale, California. All heavy equipment here is lubricated with *Texaco Marfak*. This selection is based upon their experience that only Marfak meets their needs.

YOU CAN haul the heaviest loads over the roughest terrain, in the hottest weather . . . assured of full protection . . . when you use *Texaco Marfak*. *Texaco Marfak* protects wheel bearings, steering connections and chassis parts *twice* as long as ordinary grease.

Containing high grade heavy-bodied mineral oil, *Texaco Marfak* provides a tough film equal to the heaviest loads. Marfak is tough, stringy, fibre free.

Texaco Marfak seals out dirt, mud, road water. Does not separate, leak out, to get on your brake lining, because it maintains its original consistency at the outer edges of the bearing while lubricating effectively within.

Trained automotive engineers will gladly demonstrate savings with *Texaco Marfak* in your heaviest equipment. Phone the nearest of more than 2300 warehousing points in the 48 States, or write:

The Texas Company, 135 E. 42nd St., N.Y., N.Y.

Texaco Dealers invite you to tune in The Texaco Star Theatre—starring Kenny Baker and Frances Langford—Every Wednesday Night—Columbia Network—9:00 E.D.T., 8:00 E.S.T., 8:00 C.D.T., 7:00 C.S.T., 6:00 M.S.T., 5:00 P.S.T.

TEXACO

REG. T.M.

TEXACO MARFAK

Choosing the Paving For Secondary Roads

The Character of Traffic, Climatic Conditions, Cost And Types of Aggregate Lead to Michigan's Choice

THE selection of an oil-aggregate mixture for bituminous surfacing of the secondary road system in Michigan was arrived at by a careful study of all factors affecting cost, methods of construction and maintenance, and availability of aggregates as well as the character of the traffic. This mixture provides a dustless, durable, non-skid surface for automobile traffic. The cheap available sand-gravel and stone aggregates are suited to this dense mixture which requires only about 4 per cent by weight of an inexpensive slow-curing oil, SC6-A. The aggregate contains about 45 per cent by weight passing a 10-mesh sieve, but a small amount of limestone dust is added as a filler. The mixture can be produced cheaply in most parts of the state and the use of stockpiles provides low-cost maintenance.

Both road-mix and plant-mix oil-aggregate construction were first laid by the Michigan State Highway Department in 1935. Some additional road-mix was laid in 1936, but since then the entire oil-aggregate program has been confined to plant-mix construction. A total of 750 miles has already been laid and the 1940 program calls for about 250 miles more.

Many Michigan county highway organizations have successfully laid, and still continue to lay, oil-aggregate and other types of bituminous surfaces by road-mix methods with their own equipment and forces. The Michigan State Highway Department, however, believes that the contract system of road construction is the most economical and best suited for all interests and for the general economy.

Road-Mix

Road-mix construction has some difficult problems for Michigan conditions and also some serious drawbacks under the contract system of construction. In the first place, the oil-aggregate dense-graded mixture requires for durability a uniform gradation of aggregate from coarse to fine, including suitable 200-mesh materials and freedom from moisture. Over 2 per cent moisture is harmful and less than 1 per cent is desirable. The frequent rains of spring and autumn limit good construction to the few summer months of Michigan if road-mix methods are used. The delay and expense to a contractor, in long drawn-out manipulations to blend aggregates properly and to free such windrowed aggregates from excessive moisture due to frequent rains, are considerable. With road-mix construction, traffic on state highways generally must be detoured; and additional detour expense and inconvenience to the traveling public because of such delays are further problems. Since the favorable road-mix construction season is in the comparatively dry summer months when tourist traffic is at its peak, Michigan is faced with a real detour problem, and annoyance to the tourist industry which is second only to the automobile industry in importance in that state.

Road-mix machines and traveling plants, while capable of more efficient and speedy construction than with ordinary blade machine or patrol graders, are still subject to many of the drawbacks and difficulties already expressed, according to J. G. Schaub, Engineer of Construction and Operations, Michigan State Highway Department, as expressed in his paper presented at the Purdue University Road School in January.

Plant-Mix

Michigan has therefore standardized on plant-mix oil-aggregate construction for its secondary roads. Most any standard batch-type asphalt plant is permitted. Michigan is securing uniformly graded mixtures with carefully controlled oil content by batch-weight proportioning and mixing. The use of driers provides aggregates with less than 1 per cent moisture and permits a much longer working season. Oil-aggregate construction is started as soon as the spring break-up is over and has been laid as late as Christmas in Michigan.

The gravel road surface is shaped to a crown of 1½ to 2 inches for a 20-foot wide surface and to a proper grade to insure good riding quality. This is done with patrol graders or maintainers when the gravel surface has the proper amount of moisture.

The base is then primed one-half width at a time with about ¼ gallon per square yard of cut-back asphalt or tar prime. After the prime has cured, a matter of two or three days, the oil-aggregate mixture is placed one-half width in two layers by means of mechanical self-propelled spreaders such as the Adnun, Barber-Greene or Jaeger machine. Inequalities in the base are greatly reduced by the two-layer method with these types of spreaders and better compaction is obtained. The compacted thickness is approximately 2½ inches, obtained by using 250 pounds of mixture per square yard. Smooth-riding surfaces can also be obtained with road-mix methods, but capable blade-grader operators are not plentiful. The mechanical method of spreading is generally more fool-proof. A tandem roller of 5 to 8-ton weight rolling only once or twice over to close the surface is required. Traffic assists in providing compaction and is encouraged to use the freshly laid surface after the roller has passed over once.

This method of laying the surface interferes very little with traffic flow as only around the machine and a very short distance behind is one-way traffic necessary.

(*Concluded on page 19*)

LORAIN CONVERTIBILITY
CLAMSHELL
DRAGLINE
CRANE
SKIMMER
BACKDIGGER
LORAIN
Gives You 6 Machines in 1
Buy the Lorain that fits your needs today and forget about tomorrow. Their complete "front end" convertibility lets you call your shots. Regardless of what boom equipment you buy originally for a ⅜ to ¾-yd. Lorain, it can be converted readily to the proper boom for most efficient operation on future jobs of a different nature. The same boom-foot connections are used for all booms, cable leads are easily changed, and easily-installed split lagging in various diameters provides the correct line pulls and speeds for each boom.
And no matter what type boom you install on a ⅜ to ¾-yd. Lorain, you're assured of first class performance. Every one of these units is built to Balanced Center Drive design for direct-to-the-point power application, increased capacities per pound of weight, and a stronger, simplified construction. Write today for catalogs describing this versatile line of shovels and cranes.
UNIVERSAL CRANE DIVISION
THE THEW SHOVEL COMPANY
LORAIN, OHIO
THEW CENTER DRIVE
3/8 to 3/4 YD. LORAINS

Guaranteed for One Year!
GRIFFIN
WELLPOINTS and PUMPS
Insist on this guarantee when next ordering dewatering equipment.
THERE'S A DIFFERENCE — INVESTIGATE
GRIFFIN WELLPOINT CORP.
725 East 140th St., New York, N.Y.
Phones: MElrose 5-7704-5

C. & E. M. Photo

The start of steel erection at the west end of the new viaduct on U.S. 20 west of Dubuque, Iowa.

Erecting Steel Viaduct With Light Equipment

Jensen Construction Co. Erected 429-Foot Bridge Under Difficult Conditions near Dubuque

(*Photo on page* 40)

✦ LOCATED at the bottom of a steep hill on the west and with a stream and a railroad on the east, the erection of a 429-foot multiple span truss bridge or viaduct on the relocation of U.S. 20 entering the city of Dubuque, Iowa, from the west, was tackled by the Jensen Construction Co. of Kimballton, Iowa. The spans from the west to the east are 129 feet 1 inch, 167 feet 8½ inches, and 131 feet 9¾ inches center to center of bearings and with a 4 per cent grade up toward the west. The framing consists of outside trusses with girder floor beams and five I-beam stringers to carry the 24-foot roadway. The structure spans the small creek and the Illinois Central single-track line at this point.

Handling the Steel

The steel was hauled from Dubuque and skidded down the steep slopes at the abutments. The pieces were snaked into position by a long line from an Osgood crane with a 50-foot boom and then raised and set by a wooden stiffleg derrick on a light wooden traveler on the floor system. The 40-foot wooden boom of the derrick and the hoist line were handled by a double-drum Clyde hoist powered by a Waukesha motor.

The steel for the first span was set from the abutment on three pairs of timber piles on each side under the trusses. These were driven by using the stiffleg derrick from the top of the new steel. The center span was erected without falsework by cantilevering from the end spans and erecting the center section both ways as in standard cantilever erection.

The concrete for the abutments and the two pairs of piers was mixed in a Koehring 3-bag side-skip 4-wheel trailer mixer with the aggregates weighed accurately in wheelbarrows on a Fairbanks wheelbarrow scale. The erection crew under the direction of the Superintendent, Evald Jensen, consisted of four erectors, two ground men and the hoist and crane operators. With this small crew remarkable speed was maintained in completing the structure.

The steel was furnished by the Clinton Bridge Works, of Clinton, Iowa. The Resident Engineer for the Iowa State Highway Commission was S. A. Schackle.

Diaphragm and Road Pump Models Improved

Announcement has been made by the Novo Engine Co., 216 Porter St., Lansing, Mich., of a number of improvements in its Model AD diaphragm pump as well as in the Novo road pump.

The latter has a new streamlined overall design with a lower center of gravity for both pump and power unit. Power transmission is by multiple silent roller chain, and there are only two reductions from the power unit to the pump crankshaft, resulting in high pump efficiency, according to the manufacturer. Each cylinder and each set of valves has a separate cover to allow inspection and repair. The truck wheels are roller-bearing equipped, for easy portability, and a spacious tool box has been included at the rear of the pump.

Among the features of the improved Model AD diaphragm pump is power transmission and reduction by helical cut gears to increase efficiency and quietness of operation. The eccentric shaft is bronze-bushed, which cuts down wear and servicing. A clean-out hand hole has been placed on the suction side to provide a means of cleaning the pump in three minutes, without the necessity of removing the diaphragm. The gear case has been made oil tight, allowing the gears to be flooded with oil. Suction and discharge have been threaded on the inside to receive a full 4-inch connection to allow a freer flow of water.

Copies of Bulletin No. 169 on the improved Novo road pump and of Bulletin No. 167-B on the Model AD diaphragm pump may be secured by those interested direct from the manufacturer or from CONTRACTORS AND ENGINEERS MONTHLY.

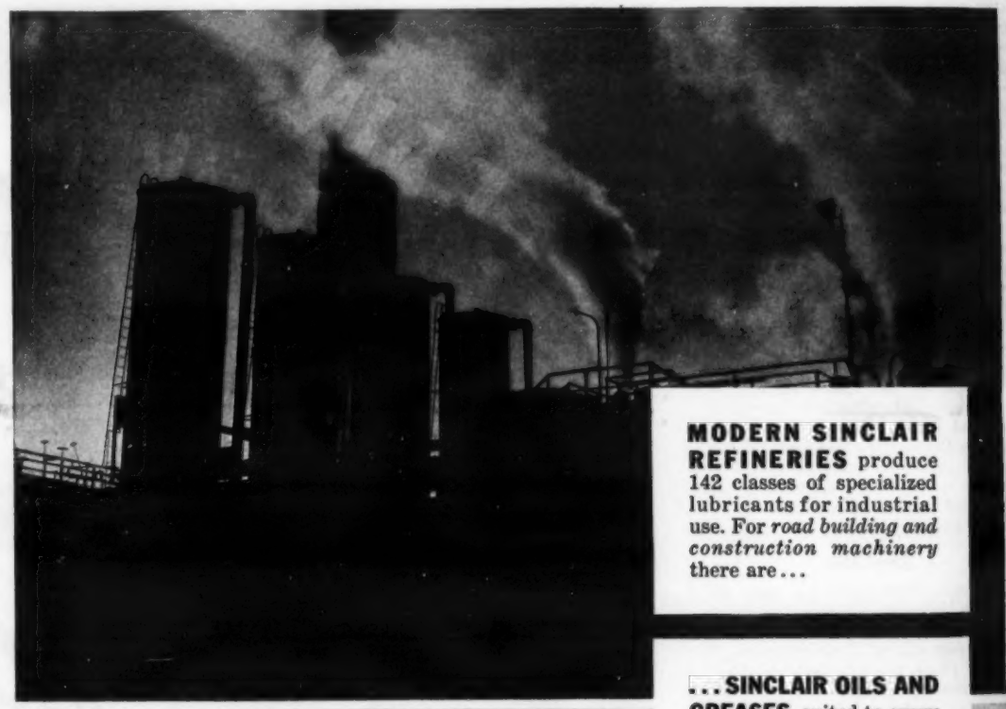
PALMER
Friction Materials
for every kind of braking

On your power shovels—

Use PALMER Asbestos Metallic Molded Friction Blocks and Industrial Lining for sureness, speed and stamina in braking. No slowing down, because of uncertain, slipping brakes. PALMER Blocks and Lining make good!

Only one grade—the best. Many shapes and sizes, in stock or made to special order.

PALMER
Asbestos & Rubber Corp.
180 N. Michigan Ave., Chicago, Ill.



MODERN SINCLAIR REFINERIES produce 142 classes of specialized lubricants for industrial use. For *road building and construction machinery* there are...

...SINCLAIR OILS AND GREASES suited to every type of excavator, tractor, mixer, roller, grader, crushing plant, etc. These specialized lubricants promote top performance under the most severe operating conditions and keep maintenance costs low.

Some 2,000 Sinclair bulk plant agents provide prompt delivery. Write the nearest Sinclair office or Sinclair Refining Company, 630 Fifth Avenue, New York, N. Y.

* * *

(Left) Using Sinclair products exclusively, this equipment of Calumet Paving Co., Indianapolis, Ind., is shown operating on 300,000 cubic yards of clay, sand and rock.

SINCLAIR INDUSTRIAL OILS
SINCLAIR REFINING COMPANY (Inc.)
2540 W. CERMAK RD. CHICAGO • 10 W. 51ST ST. NEW YORK • 1907 GRAND AVE. KANSAS CITY • 573 W. PEACHTREE ST. ATLANTA • FAIR BUILDING, FT. WORTH

Texas Rushes Repairs To Roads Used by Army

Recent army maneuvers in eastern Texas so damaged the state highway system that the Commission at its July first meeting authorized the department to make immediate repairs to several highways. Since the maneuvers are to be continued, the repairs authorized are necessarily of a temporary nature and work began at once.

Included in the work were strengthening the base and applying asphaltic prime and seal coat on 16 miles of State Highway 87 in Newton County; strengthening the base and applying asphaltic prime and seal coat on 7.4 miles of U. S. 190, also in Newton County; applying asphaltic seal coat on 12.47 miles of U. S. 190 from Newton to the Sabine River Bridge; and strengthening base and applying asphaltic prime and seal coat on 7.3 miles in Jasper County from Jasper to the Newton County line.

Reversible Wrenches

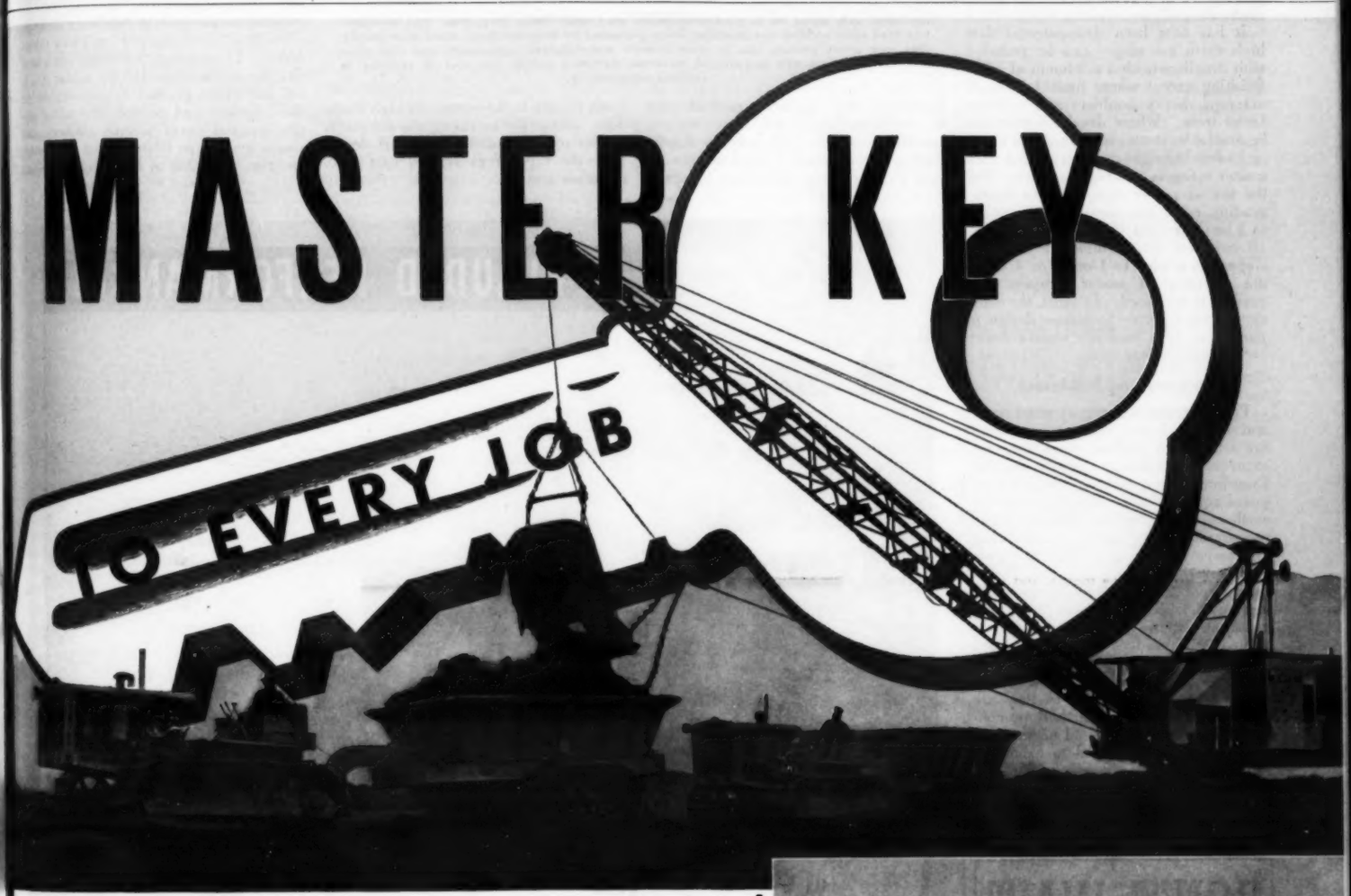
Literature describing the new C-P No. 365-R and 375-R reversible wrenches has recently been issued by the Chicago Pneumatic Tool Co., 6 E. 44th St., New York City, which will be glad to send copies on request. These wrenches are particularly designed for use in structural steel work and assembling tunnel segments.

The No. 365-R employs a slow-speed rotary motor, has short overall length, is easy to handle, will apply or remove nuts up to and including 1¼-inch bolt size and weighs 27½ pounds. The No. 375-R is designed for applying or removing nuts up to and including 1¾-inch bolt size, has a slow-speed rotary motor, a long tapered nose end, and weighs 61 pounds.

New Booklet Describes Asphalt Heating Kettles

Over thirty illustrations in 8 pages of a new booklet help to give contractors and engineers a clear concise picture of the features of the Heet-Master asphalt kettle made by the Aeroil Burner Co., Inc., West New York, N. J. The booklet describes as well as illustrates why the Heet-Master saves 50 per cent on fuel bills and heats and melts twice as fast, according to the manufacturer.

Copies of this new bulletin, No. 196E, may be secured without obligation direct from the Aeroil Burner Co.



WE TAKE YOU to the International Boundary Commission project, near Rio Hondo, Texas. Master factor in the rapid progress of this notable undertaking is a fleet of "Caterpillar" Diesel Tractors:

Their power, traction and maneuverability afford wide application to various types of equipment—giving them the versatility to get in on practically every kind of job.... They spot wagons under the dragline—run huge loads of pay-dirt over rough or soft-haul roads (or no roads at all)—dump them—spread them with bulldozer attachment—pump water from drainage ditch to wet down dusty fills—pull discs and tampers for thorough compaction. Rain and soggy ground conditions do not stop these powerful broad-tracked, sure-gripping motive power-plants from hauling, dumping and leveling heavy, water-logged earth and clay.

Through perfect co-ordination of tasks and implements, the work goes on CONTINUOUSLY—at a steady, time-saving pace.... A fine example of today's way of handling big contracts toward quick completion and maximum profit!

CATERPILLAR TRACTOR CO., PEORIA, ILL.

A "Caterpillar" Diesel D8 Tractor and Athey wagon combinations hauling material loaded by a 3-yard dragline. Average load, 14.4 yards. On 1700-foot haul, unit averages 5 trips per hour. (No time wasted here . . . as a loaded unit moves on, another is coming up under the dragline.)

B One "Caterpillar" Diesel D8 leveling wagon fills with bulldozer and at same time pulling disc for better compacting. Another pulls sheepsfoot tamper.

C Pumping water with power take-off, to wet down dirt for ready handling. On 6-foot lift from drainage ditch, 6-inch pump moves 1200 gallons per minute.

CATERPILLAR

REG. U.S. PAT. OFF.

TRACK-TYPE TRACTORS • ROAD MACHINERY • DIESEL ENGINES AND ELECTRIC SETS

Modern Machines Aid To New Highway Design

(*Continued from page 2*)

tain and hill topography for years to come. But finish-grading to the rounded cross section, which tends to merge cut slopes into the steep mountain slopes behind them, cannot be done with the usual shovel equipment. As a result many of our fine National Park and National Forest roads have in the past been finished to a rounded section by hand methods.

It has now been demonstrated that high earth cut slopes can be rounded with draglines with a minimum of hand finishing except where limited by rock outcrops, heavy boulders and existing forest trees. Where draglines may not be available, steep earth slopes up to 10 or 15 feet in height can be rounded with tractor scrapers and blade graders. But the use of power equipment in finish-grading earth cut slopes rough-graded to 1 on 1 or 1 on 1½, and higher than 10 or 15 feet, is very difficult. As backslopes are graded to 1 on 2, or 1 on 3, the efficiency of motor scrapers and graders is increased. *In short, the tendency toward flatter backslope design is paralleled by a tendency toward lower excavation yardage costs.*

Scrapers and Bulldozers

Tractor scrapers, carry-type scrapers, and similar heavy scraper equipment are tending to replace other types of excavation machinery in all regions. Even in rough topography where decomposed rock occurs, and particularly on earth cut slopes in low hill and plains topography, heavy bulldozers and tractor scrapers are now reducing the costs of excavation yardage to the lowest figures ever known in the highway building industry. These types of equipment, as recent western contracts have demonstrated, will produce an ideal rounded cross section which requires a minimum of hand-labor finishing. But heavy power scrapers, adaptable as they are to a wide variation of earth slope conditions, can seldom be used in finishing high mountain cut slopes to a smooth rounded section after rough grading has been completed to a 1 on 1 or steeper slope more than about 10 to 15 feet high. There does appear to be some possibility that operating methods can be developed with this new scraper equipment which will permit finish-grading to a rounded slope section of each level or lift as excavation proceeds from the top to the bottom of high earth cuts. But in the meantime the steepness of the rough graded slopes will determine the type of excavation unit used in finish grading.

Public Roads Administration Photo

Sprigged side slope on a sand-bituminous road near Lake City, Fla. The shoulder has been solid sodded, the shoulder slope protected by strip sodding. Note how readily this new cross section can be mowed with power-driven equipment, and also that because no guard rail is required on these flattened slopes, the cost of mowing is reduced accordingly.

Blade and Motor Graders

Modern blade graders of many types are now in use in finish-grading the low earth slopes which are typical of highways in plains and rolling hill and valley topography of all regions. On most of our demonstration roadside-development projects, under such favorable conditions, hand labor methods are no longer practiced. Both in these demonstrations and on the most recent regular construction contracts, in country where rock outcrops are infrequent, a rounded cross section is being developed by the use of motor equipment which is in many ways superior to the hand-graded product. Where hand labor has been used in grading in the past, it has been difficult to avoid a "sand-papered" or hand-raked finish. Experiments have demonstrated that the minor ridges left by motor graders and blade graders are favorable to the lodgment and growth of seed of native ground cover plants. Where cut slopes lower than 10 or 15 feet are usual, and rough grading of backslopes is done

(*Concluded on next page*)

DON'T WAIT

for a snowfall to buy snow removal equipment. Ross Snow Plows, Burch engineered and Burch built assures correct design and the best in material and workmanship. There is a Ross plow for every truck and tractor and to meet any snow removal requirement.

Manufactured by

The BURCH CORPORATION

Crestline, Ohio

EQUIPMENT BUILDERS FOR FIFTY YEARS

Blowing a Blanket of Concrete with Gardner-Denver "Portables"

A two-inch blanket of cement, blown from nozzles by compressed air, covers the slopes of the Palos Verdes Reservoir for the water supply of Los Angeles.

Gardner-Denver Portable Air Compressors supplied the air necessary to blow this cement through hoses. Each man covered a strip 25 feet wide by 200 feet long in one shift. This required *continuous full-load operation* throughout every shift.

These compressors, powered by "Caterpillar" Diesel Engines, supplied all the air needed—despite the dust and heat of summer.

Low-cost operation, small maintenance charges, and a constant, adequate supply of air speeded this job to completion.

THERE'S a reason for all this *user-praise* of Gardner-Denver Portable Compressors!

Gardner-Denver "Portables," you see, are *water-cooled* for constant and consistent performance. In heat or cold, at sea level or on steep mountain slopes, these compressors deliver an unfailing supply of air—efficiently and at low cost. AND they are built to take it—to stay on the job—no matter how tough.

In Gardner-Denver Portables, you get all the air you need at low discharge temperatures with the advantage of less horsepower per cubic foot of air and less fuel, than you get with any air-cooled portables of like capacity.

Lower your construction costs—increase profits—by using Gardner-Denver Portable Compressors, the efficient, low-cost, sturdy compressors. You can obtain complete information by writing Gardner-Denver Company, Quincy, Illinois.

GARDNER-DENVER SINCE 1859

Streamlining Halts Erosion, Snow Drifts

(Continued from preceding page)

to 1 on 2, 1 on 3, or even flatter, this modern finish-grading equipment has come into its own.

Even on secondary roads, constructed at a low cost per mile, there is now little justification for the old "railroad cross section" in easy topography. Maintenance costs must be reduced to the lowest possible figure on these secondary roads. The cost of maintaining the old earth cross section with its sharp-angled slope crests and V-ditches, which encouraged erosion and stopped drifting snow in the middle of the traveled way, has always been high.

Improved Roadside Appearance

The immediate effects of the adoption of the standard rounded cross section on an increasing mileage of our new highways in many states of all regions of the country can be observed in improved highway appearance. The permanent effect of the rounded cross section in encouraging the establishment of native vegetation and thus controlling erosion on bare slopes and gutter areas can be observed on roadside-improvement demonstrations, some of which were completed in the early 20's in a few northeastern states. The smooth rounded grass and vine-covered slopes on eastern parkways and on many eastern and southern state highways did not result from seeding, sodding and ground cover planting operations alone. The finished appearance of these highways must mainly be attributed to *good basic rounded cross section grading* made possible by the cooperation of grading foremen and contractors with the engineers of design and construction and with the landscape engineer before seeding or planting was begun. Good highway appearance must be *built into new highways by cooperation of the whole highway department organization with the landscape engineer,* beginning with original design and location and ending with highway maintenance.

Snow-Drift and Erosion Control

The maintenance engineer of a western state recently remarked to the writer:

"This rounded cross section is solving many of our worst maintenance problems. Our annual costs of snow removal in recent years have been greatly reduced. We have rounded the old sharp-angled cross section on our main highways where some of the worst drifting once occurred and those drifts have never come back."

Incidentally, as a state-wide inspection showed, natural seeding has covered these rounded slopes throughout this same semi-arid state within three to five years after rounding, and erosion is now being controlled by this volunteer growth of native vegetation. Under the more favorable soil and climatic conditions of the northeast, south and middle west, vegetation can usually be established on the rounded cross section in about two seasons.

In the last analysis the rounded cross section is designed to make the most of the material (earth) of which highway slopes, gutters, and shoulders are built. *All earth slopes in nature are rounded slopes.* Even the sharp edges of solid rock are in time worn away to rounded edges. This rounding of surfaces is nature's first step in covering bare soil with protective vegetation. Therefore, *by rounding our highway cross sections, we are working with nature; we are setting in motion processes of roadside improvement which cannot fail to become more and more effective with each succeeding year.*

Cooperation Benefits All

Thanks to the cooperation of all concerned, the modern rounded cross section has become a permanent feature of the American highway system. Thanks to the modern rounded cross section, varied to fit different conditions of soil and topography, bare eroding slopes and gutters will no longer be a feature of future highways. Green roadsides are becoming a part of the fine open country through which our highways pass.

By cooperation with their fellows and with nature, engineers and contractors are aiding in those processes which are tending to build not only better highways but a better civilization.

Special Preformed Rope For Cable-Controlled Units

A new leaflet describing the special Flex-Set preformed Yellow Strand wire rope, made to meet the requirements of R. G. Le Tourneau, Inc., for its line of cable-controlled scrapers, bulldozers, rooters and cranes, has recently been issued by Broderick & Bascom Rope Co., St. Louis, Mo.

Copies of this leaflet which describe the features of this special wire rope and illustrate its uses on Le Tourneau equipment may be secured by interested contractors and engineers direct from the manufacturer by mentioning this item, or from this magazine.

New Dump Hoists For Light Trucks

A new hydraulic dump hoist, for installation on ½, ¾ or 1-ton truck chassis for the lighter jobs up to 2,000 pounds payload, has recently been announced by the Bird-White Corp., 624 So. Michigan Ave., Chicago, Ill. The compactness of the entire mechanism makes possible low mounting, low loading height and light weight.

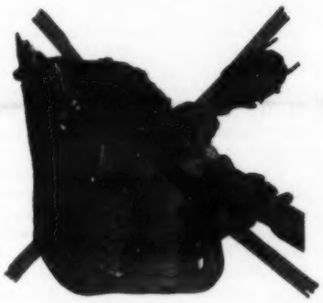
Two high-pressure hydraulic rams are used to operate the hoist. These are mounted well forward of the hinge points in a vertical position, affording a direct lift to the load. Operating features include a maximum dumping angle of 60 degrees, cab control, raising and lowering the dump body while the truck is in motion, high-speed operation in raising and lowering the hoist, and minimum sidesway and top heaviness.

Further information on these new hydraulic dump hoists may be secured direct from the manufacturer by mentioning this magazine.

COMPLETE
WELL POINT SYSTEMS
WILL DRY UP ANY EXCAVATION
Faster—More Economically
Write for Job Estimate and Literature
COMPLETE
MACHINERY & EQUIPMENT CO., Inc.
Dept. C
36-40 11th St., Long Island City, N.Y.
Tel. IRonsides 6-8600

SHOVEL USERS—
The capacity of your shovel is limited to the capacity of its dipper
—change to Oversize WELDED DIPPERS
—for Increased Capacity

SOLID CAST DIPPER
4-Yd. Capacity



Decrease in dead weight in welded dipper permits use of bigger dipper for bigger pay load.

OVER-ALL LOADED WEIGHT IS IDENTICAL IN BOTH CASES

PMCO WELDED DIPPER
4¾-Yd. Capacity
Increased Production

What a Welded Dipper will do for Your Shovel
—because of its lighter weight
—with no loss of strength

1. Increase Production up to 30%
2. Increase Speed
3. Increase Digging Radius
4. Increase Digging Depth
5. No Increase in Power
6. No Increase in Labor
7. Cost of dipper is paid by savings in only a few months

What it Has Done
—because of its lighter weight
—with no loss of strength

Experience Record No. 1810

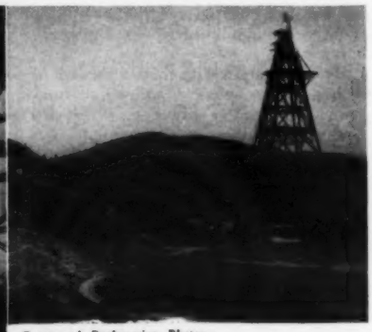
A 2½ yd. welded dipper can be used on a 2 yd. standard shovel. In this case the pay load increases 25% . . . and to new shovel buyers a 2½ yd. shovel becomes available at a 2 yd. shovel price. A typical experience record is shown below:

Size of Shovel	Total Cost
2 yd.—with heavy solid cast dipper	$25,000
2½ yd.—with heavy solid cast dipper	32,000
To save money, user equipped:	
2 yd.—with 2½ yd. PMCO light-weight welded dipper. CREATING 2½ yd. CAPACITY	25,000
Savings—on Original Investment	$ 7,000 or 22%.

PARTIAL LIST OF REPRESENTATIVE CUSTOMERS

Lima Locomotive
Link-Belt
Thew-Lorain
Koehring
Manitowoc Shipbuilding
Ayreshire Patoka Collieries
Butler Brothers
Oliver Iron Mining Co.
Pickands, Mather & Co.
The M. A. Hanna Co.

PETTIBONE MULLIKEN CORPORATION
4710 West Division Street — Established 1880 — Chicago, Illinois



Bureau of Reclamation Photos
Erecting the head tower for the cableway system which will place the concrete in Shasta Dam.

Seven Cableways Serve Shasta Dam

Head Tower 460 Feet High And Longest Span of 2,670 Feet Feature Concrete-Placing Equipment

By HENRY W. YOUNG

✦ THE Pacific Constructors, Inc., general contractors for the erection of Shasta Dam, are proceeding rapidly with the excavation for the dam foundation under their contract with the Bureau of Reclamation. Construction of the concrete mixing and placing plant was pushed to completion for the start of concreting late in July.

The outstanding feature of the concrete placing plant is a 460-foot high structural steel cableway head tower, from which radiate seven 20-ton Lidgerwood cableways, with traveling tail towers so arranged as to provide entire coverage of the dam, spillway and power house. The longest span is 2,670 feet, with various other short spans.

Under the three long-span cableways lies approximately 60 per cent of the dam concrete, with the balance of the yardage of the dam and power house being distributed more or less uniformly by the other arcs of coverage.

Cableways, or sky hooks as they have been called, are not new to the construction industry, having been used for concrete and steel placement on many large projects of dam construction and other works, so that the cableways in themselves offer no outstanding feature of engineering construction in a project of this nature. The 460-foot head tower does, however, provide a dominant and outstanding feature of the plant.

The cableway hoists are mounted approximately 260 feet above the ground, on a hoist floor framed into the tower. The connections for the track cable are made at the top of the tower through large gudgeon pins mounted on roller bearings of sufficient capacity to allow full motion of the cableway.

The tower is 184 feet square at the base, and the hoist floor is about 90 feet square. A typical leg section involves the use of two 36-inch-wide flange beams, 429 pounds, and cover plates of various thicknesses as required, up to 2½-inch. This section weighs about one ton to the foot. The total weight of the tower is approximately 4,000 tons.

The upper half of the tower, from the cap girder to the hoist floor, is inclosed in 16-gage galvanized corrugated sheet steel. The operator stations will be located approximately 12 feet above the hoist floor, to provide visibility by the operator of his hoist, and of the area covered by the cableway and bucket dock, so that he is at all times in full command of the rig he is operating.

A 55-foot 15-ton pillar crane is mounted on top of the head tower to provide servicing of the carriage and sheave nests. A construction elevator is provided on one of the tower faces to serve both passenger and machinery traffic up and down the tower.

The Mixing Plant

Five Koehring 4-yard concrete mixers are concentrically placed in the mixing plant, together with Johnson automatic batching equipment. Aggregates will be delivered to the bunkers over the mixing plant by a belt conveyor system from a live storage pile 4,000 feet down from the plant. These aggregates come from the North Kutras deposit near Redding over a 10-mile continuous belt conveyor system described on the next page. The cement storage consists of 10 steel silos, each 23 feet in diameter and 70 feet high, with approximately 50,000 barrel capacity.

Shasta Dam is the principal feature in the Central Valley Project of the Bureau of Reclamation in California, for which Walker R. Young is Supervising Engineer. The dam is being built for the Bureau by the Pacific Constructors, Inc., with Frank T. Crowe as General Superintendent and B. W. Goodenough, Chief Engineer.

Marion Service Station Opened for N. Y. Area

For the convenience of its customers in greater New York, the Marion Steam Shovel Co., Marion, Ohio, has opened its own parts and service station at 427 Grand Ave., Jersey City, N. J. This depot will be under the jurisdiction of the New York sales office, located in the Chrysler Bldg., New York City, and will result in more efficient service.

World's Fair Exhibit Tells Public About Many Highway Units

(*Photos on page 40*)

One of the outstanding new exhibits in the industrial field at the 1940 New York World's Fair is the National Highway Transportation Exhibit. This exhibit, a new version of the old National Motor Truck Show, was originally designed to interest only those connected with the industry but for the World's Fair has been broadened to convey to the general public the fact that everyday comforts and necessities depend vitally upon highway transportation and that highway developments closely dovetail the average person's everyday activities. The interest displayed in the exhibit seems to prove that it is impressing upon Fairgoers the Show's slogan, "Highway Transportation Serves Everyone."

The exhibit occupies an area of 30,000 square feet just outside the Maritime, Transport and Communications Building, and includes a wide variety of transportation units, dump trucks, heavy-duty trucks for state and county highway departments as well as contractors, engines, dirt-moving scrapers, refuse collection trucks, and similar equipment. At the Gar Wood exhibit are working models of a 12-yard hydraulic scraper and of a hoist and dump body, as well as a life-size Gar Wood-Continental 3-yard scraper and Gar Wood hoist and dump-body units. Hercules Motors displays a Ford truck in which the gasoline engine has been replaced by one of the Hercules diesels. Heil has a number of heavy-duty dump bodies, mounted on FWD chassis and powered by Cummins diesels, which are suitable for all-year-round maintenance work and for contractors' service. Reo displays two of its line of five new trucks, while Mack has a number of heavy-duty units in the exhibit.

While a large number of visitors to the Exhibit are contractors, engineers, and transportation men, representatives at the Exhibit report great interest on the part of the average Fairgoer. The Gar Wood representative stated that a large number of inquiries are made about the dirt-moving scrapers, many of these questioners reporting that they had seen similar units at work on jobs and wanted to know more about them.

Among the manufacturers who are exhibiting with the National Motor Truck Show, Inc., sponsor of the National Highway Transportation Exhibit, are Anthony Co., Inc.; Bendix-Westinghouse Automotive Air Brake Co.; Brockway Motor Co.; Diamond T Motor Car Co.; Eaton Mfg. Co.; Four Wheel Drive Auto Co.; Galion Allsteel Body Co.; Heil Co., Hercules Motors Corp.; Mack International Motor Truck Corp.; Marmon-Herrington Co.; Quaker City Iron Works; Reo Sales Corp.; A. Schrader's Sons; Silent Hoist Winch & Crane Co.; Thornton Tandem Co.; Titeflex Metal Hose Co.; Transportation Engineers, Inc.; Trucktor Corp.; and Gar Wood Industries.

Long Succeeds Koehring

After 33 years as President of the Koehring Co., Milwaukee, Wis., W. J. Koehring has resigned from that position and will act as Chairman of the Board. G. E. Long, Treasurer since 1932, has been elected President.

Minute "HOW" Stories

Making odd jobs pay on relocation of U. S. Hy. 40, near Lovelock, Nevada. Contractors Fredericksen and Westbrook used this LeTourneau 'Dozer-Drag Scraper team on clean-up work to keep five Carryalls and three other LeTourneau 'Dozers on productive work.

Double Tractor Output

Combine 'Dozing with every LeTourneau tool . . . do these jobs with the same tractor . . .

Add Drag Scraper operation to 'Dozing (above) . . . double up on your short haul and general utility work at no extra cost for tractor investment. Both tools operate from standard double-drum Power Unit.

Hook on a LeTourneau Rooter—a rugged mate for your pioneering LeTourneau 'Dozer . . . saves blasting time and expense . . . more than pays for itself in scraper loading time saved and extra pay yards loaded.

Team up with a Carryall—All you need do is add a LeTourneau front-mounted Power Unit for independent 'Dozer operation and the rear of your tractor is left free for today's biggest money-maker—the LeTourneau Carryall Scraper.

Switch to a Tractor Crane for your heavy lifting jobs. LeTourneau Cranes will safely handle loads from 4 to 10 tons, depending on tractor size . . . are quickly and easily interchangeable in 15 to 20 minutes.

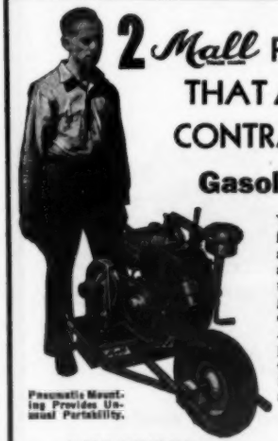
Thus, LeTourneau interchangeable tools offer you the opportunity to double up on tractor production over a complete range of jobs. Begin the savings on your job with a demonstration. See your LeTourneau "Caterpillar" dealer NOW!

LE TOURNEAU

Peoria, Illinois — Stockton, California

2 Mall PORTABLE POWER TOOLS THAT ARE MAKING MONEY FOR CONTRACTORS EVERYWHERE!

Gasoline Powered Vibrator



Pneumatic Mounting Provides Unusual Portability.

You can handle all types of concrete construction faster, with less labor, less power, less water, sand and cement and use coarser aggregates when you are equipped with this low-priced MALL vibrator that operates all day on from 1½ to 2 gallons of gasoline. It eliminates honeycombs and voids and expensive hand patching after forms are removed. A flexible shaft transmits the power to the exclusive, patented vibrating unit which delivers 7000 frequencies per minute. Attachments can be furnished for Surfacing, Grinding, Drilling, Sanding, Sawing and Pumping.

LOW-PRICED ELECTRIC Mall Saw

Balanced for safe, one hand use with greatest weight on long end of board. Has spring safety guard, loop handle with built-in switch and swivel base for bevel cuts to 45 degrees, 8½" blade, capacity of 2¾".

MODEL 85
Blade Size 8½"
Capacity 2¾"
Other models up to 4¾" capacity

Write Today for Free Demonstration of These Tools and Full Information

MALL TOOL COMPANY, 7743 South Chicago Avenue, Chicago, Illinois

OFFICES AND DISTRIBUTORS IN PRINCIPAL CITIES

Sand and Gravel For Dam Project

Shasta Dam in California Will Require 10,400,000 Tons, Being Prepared by Columbia Constr. Co.

By HENRY W. YOUNG

✦ WHEN concrete placement reaches its peak at Shasta Dam, probably sometime in 1942, 16,000 tons of gravel and 6,000 tons of sand will be required daily. The total amount for the whole job will be 7,600,000 tons of gravel and 2,800,000 tons of sand. The Columbia Construction Co., Inc., of Oakland, Calif., has contracted to deliver this total of 10,400,000 tons for the price of $6,047,972, which includes a change order providing for delivery by belt. This contract is a separate one from that for the construction of the dam by the Pacific Constructors, Inc., and was awarded to Columbia as the lowest of four bidders by the Bureau of Reclamation, Central Valley Project, of which Walker R. Young is Supervising Engineer. S. J. Davis is General Superintendent for the Columbia Construction Co., Inc.

The aggregates are being taken from what is known as the North Kutras tract, in the city limits of Redding, Calif., and 12 miles downstream from the dam site. They will not travel 12 miles, however, but 9.5 miles, almost as the crow flies, over the hills and far away, by a conveyor-belt system that dwarfs anything of the kind ever attempted. After the aggregate is delivered by Columbia to the Pacific Constructors' hoppers at Coran, below the dam, the latter will transport them over another belt conveyor, a mile long, to the mixing plant.

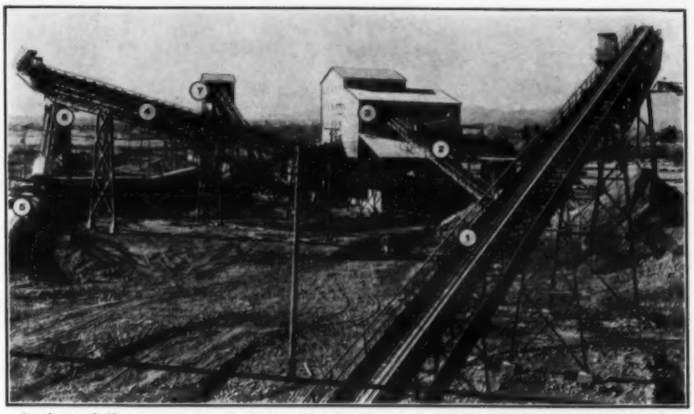
It was originally intended to deliver the aggregates by railroad, including a 4-mile spur from the deposit to a proposed interchange yard on the main line of the Southern Pacific. However, the Columbia company, after further study, proposed to make delivery direct to Pacific Constructors, Inc., through a series of belt conveyors, and change orders were issued accordingly.

The Conveyor System

This 9.5-mile conveyor makes the distance in 26 flights over its own right-of-way, with a service road beside the line, illuminated at night by lights on each pole. The conveyor crosses the Sacramento River twice, Highway 99 once, and the Southern Pacific Railroad twice. All these crossings are on steel. There are five country road crossings, two on which are on steel and the other three on wooden crossings. The rest of the conveyor is on a wood structure, with the exception of terminal stations, which are of steel.

The majority of the wood structure is 4 feet 6 inches high, and the highest is 64 feet. All except one flight will be operated by 200-hp motors, one flight, the final flight to the dam, having a 75-hp motor. Four of the motors are of the regenerative type, and are used on the east slope of the Sacramento River, on down grades as steep as 25 per cent. The kinetic energy in the loaded belt, operating these motors as generators, will produce electric power to help the succeeding flights of belts over the hill.

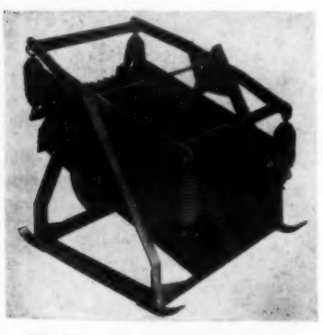
Interesting features of this great belt



A view of the aggregate plant for Shasta Dam. 1 and 2 are the raw storage conveyors; 3, the main plant building containing the screens and washing plant; 4, the processed sand conveyor; 5, the loading tunnel beneath the stockpiles; 6, blended sand conveyors; and 7, the rock conveyor.

are: 16,000 Chain Belt idlers; 11 miles of steel shafting; 83,000 anti-friction roller bearings; 50,500 malleable castings; 10½ miles of angle iron; and 20 miles of 36-inch six-ply Goodyear belt-

(Concluded on page 33)



THIS PORTABLE VIBRATING SCREEN

accurately separates 3 sizes of 100 tons of material per day. Uses only the power of 2-hp. gas engine or 1-hp. electric motor. Self-contained, easily moved. Ideal for road and construction work, concrete block making and in small quarries and factories. Available through your local equipment distributor.

Send for "CONTRACTOR'S SCREEN" Bulletin 110

ROBINS

ROBINS CONVEYING BELT COMPANY
Passaic, New Jersey

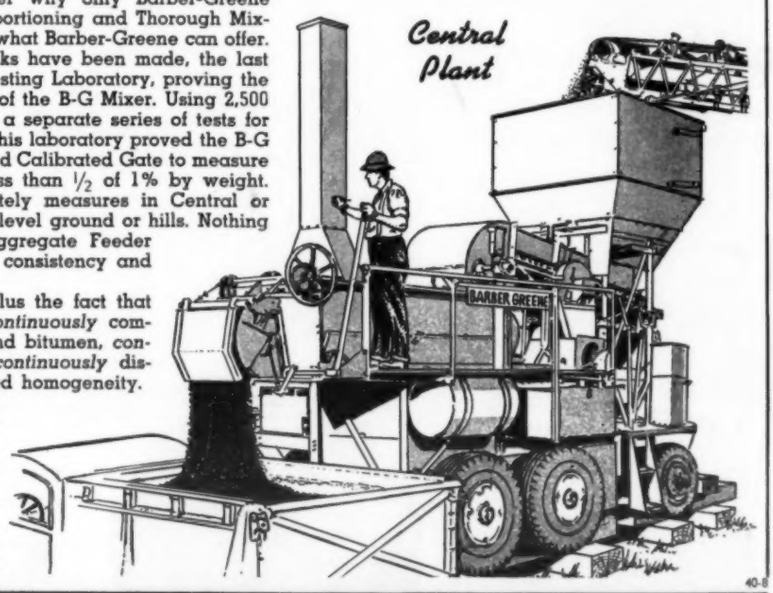
Offices in principal cities.

DID you ever wonder why only Barber-Greene preaches "Accurate Proportioning and Thorough Mixing"? It's because that's what Barber-Greene can offer.

Many convincing checks have been made, the last being by the Chicago Testing Laboratory, proving the almost perfect accuracy of the B-G Mixer. Using 2,500 pound samples, running a separate series of tests for each size of aggregate, this laboratory proved the B-G Positive Apron Feeder and Calibrated Gate to measure the aggregate within less than ½ of 1% by weight. The B-G Feeder accurately measures in Central or Travel Plant set-ups, on level ground or hills. Nothing short of a POSITIVE Aggregate Feeder will give this unrivaled consistency and accuracy.

These fundamentals plus the fact that the Barber-Greene is *continuously* combining the aggregate and bitumen, *continuously* mixing, and *continuously* discharging, give unequaled homogeneity.

Technical or practical proof is yours. Write for a report on these tests, or the names of some of the B-G owners who have mixed the thousands of miles that prove the theory that only Barber-Greene can preach.



40-B

BARBER GREENE
STANDARDIZED MATERIAL HANDLING MACHINES
AURORA ILLINOIS

The new 2-yard Jaeger High-Dump truck mixer.

High Dump Feature Of New Truck Mixers

Designed with a high-discharge point to meet unusual concrete-placing conditions, the new Jaeger line of High Dump truck mixers and agitators will deliver concrete, high or low slump, over a wider radius, spout it into higher forms, over material piles, or into large floor hoppers, according to the manufacturer, the Jaeger Machine Co., 701 Dublin Ave., Columbus, Ohio.

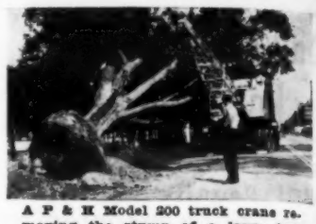
Among the features of these new mixers are the extra big drums, with top loading in one shot; the dual-mix action provided by the patented throw-back blades; a vacuum-operated discharge door; the Sypho-Meter tank with "winter-safety" water booster which assures accurate measurement of water, protects the pump in the winter, and forces the water under pressure through dual revolving water sprays; advanced-design cab-controlled truck-engine drive; two-speed shock-proof transmissions; and their compactness which permits mounting the 2-yard size on short-wheel-base trucks.

These High Dumps are made in three sizes, 2, 3 and 4-yard capacities, while the standard heavy-duty truck mixers made by Jaeger are available in sizes up to 6 cubic yards. Further information on this line of truck mixers and agitators may be secured from the manufacturer.

New Portable Compressor

A new portable compressor delivering 500 cfm at 100-pounds pressure was recently announced by the Ingersoll-Rand Co., 11 Broadway, New York City. Known as the K-500, this machine is now the largest in the I-R line of two-stage air-cooled units. Among the features of this new unit are the choice of either an oil engine or a new type 6-cylinder gasoline engine which does not require high-grade motor gasoline; replaceable cylinder liners for the engine; and a patented automatic fuel saver which changes the engine speed according to the use of compressed air.

More detailed information, including charts showing savings made possible by this new portable compressor, which is available with either wheel or skid mounting, is contained in Form 2641.



A P & H Model 200 truck crane removing the stump of a large tree from a Long Island roadside.

Fallen Trees Removed From New York Roads

The New York State Department of Public Works recently started a campaign to rid the roadsides on Long Island of rotting and fallen trees, many of which were the victims of the disastrous hurricane in September, 1938. The accompanying photograph shows some of the work on Highway 25 between Southold and Cutchogue, carried on by the Zara Construction Co. of Hewlett, L. I., N. Y. This P & H Model 200 truck crane is being used here to pull out the remains of a tree, an operation which had to be approached with caution because of the proximity of a water main. This unit also lifted giant stumps into trucks for removal.

In ordinary tree pulling or stump removal, working on soft ground, a crawler crane or tractor offers the best stability for maneuvering. But in highway work requiring long and frequent jumps between operations, a truck crane which can travel up to 30 miles an hour offers speed and economy.

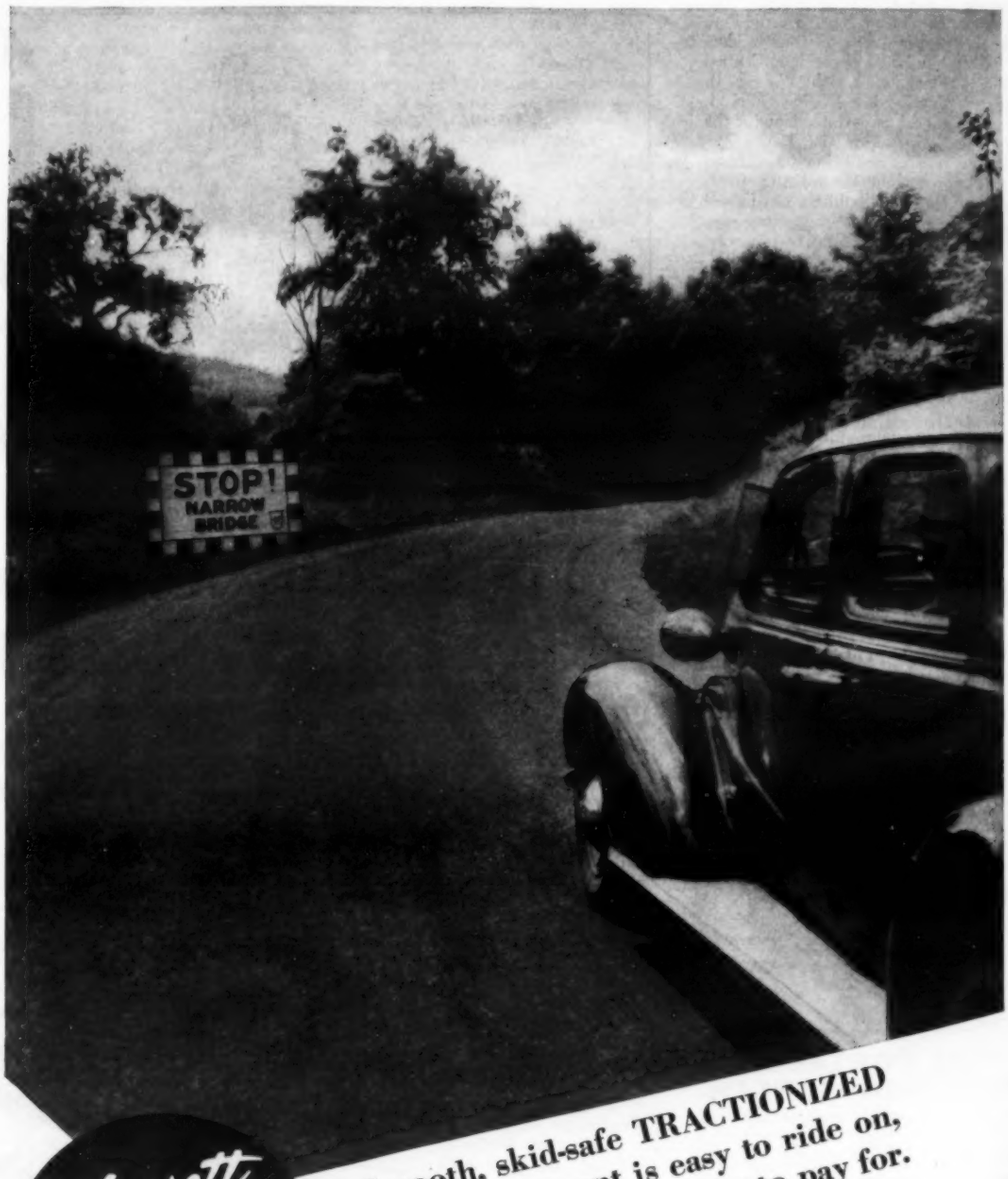
RED DEVIL
LIGHT
and POWER PLANTS
800 to 50,000 WATTS

3,000 WATT
as illustrated $395.00
on Pneumatic Tires

Finish the job quicker and save money with electricity.

Send for catalog describing generators and our complete line of portable poles for floodlighting.

E. B. KELLEY CO., Inc.
43-67 Vernon Blvd.
Long Island City, N. Y.



Barrett Tarvia
GOOD ROADS AT LOW COST

Smooth, skid-safe TRACTIONIZED Tarvia pavement is easy to ride on, easy to build . . . and easy to pay for.

THE BARRETT COMPANY
New York . . . Chicago . . . Birmingham . . . St. Louis . . . Detroit
Philadelphia . . . Boston . . . Providence . . . Lebanon, Pa.
Rochester . . . Baltimore . . . Minneapolis . . . Cleveland . . . Columbus
Toledo . . . Youngstown . . . Syracuse . . . Hartford . . . Buffalo
Cincinnati . . . Bethlehem . . . Portland, Me. . . . Norwood, N. Y.
In Canada: THE BARRETT COMPANY, LTD.
Montreal . . . Toronto . . . Winnipeg . . . Vancouver

. . . one of America's Great Basic Businesses

Plant-Mix Material For Secondary Roads

(*Continued from page* 11)

Advantage to Contractors

Contractors are able to get good production and are not delayed much by weather. The spreaders can readily handle 100 tons per hour. Plants having a 1-ton mixer box can satisfactorily produce an average of 50 to 60 tons per hour. The mixing time to coat the aggregate thoroughly is generally 10 seconds for the dry mix and 35 seconds for the wet mix. Contractors frequently work two shifts at the plant, stockpiling the mixture during one shift and hauling from both plant and stockpile to supply the spreader during the other shift, thus securing the economical advantage of the spreader's ability to lay more than a 1-ton plant can produce. All mixtures are weighed and approved, and State-tested platform truck scales are used to determine pay quantities. The contractor provides the scales and the State the weighmaster. A field laboratory is also installed at each plant with trained inspectors to insure uniform quality.

Comparison of Costs

Even though plant-mix construction has decided advantages over the road-mix method in securing uniformity and better control of the mixture and providing less traffic interference, it still might not be justified if the costs were considerably greater. It has been found in Michigan, according to Mr. Schaub's paper, that the cost of the plant-mix construction is very little, if any more, than the road-mix method when all factors are taken into consideration. By letting oil-aggregate projects in lengths of 10 to 20 miles, the unit cost of plant moving and erection is greatly reduced. Many contractors are equipped with highly portable plants which can be transported in sections over highways to otherwise inaccessible locations.

The average bid price for the 1938 program was $3.29 per ton for the oil-aggregate surface laid complete. For the 1,500 tons per mile used in Michigan, this gives a cost of $4,935 per mile. In 1939 the bids in Michigan averaged $3.10 per ton, which is $4,650 per mile. The highest price in the 1939 program was $3.95 per ton and the lowest $2.75 per ton. The cost of aggregate and length of haul were the principal factors causing this variation.

Road-mix oil-aggregate construction during 1935 and 1936 ran from $3,790 to $4,240 per mile, without taking into account detour cost. While Michigan has not built road-mix projects lately, quite a number of county projects have been built under State supervision in connection with the Federal Aid secondary program. Some of these projects were oil aggregate and some asphalt or tar retread. The direct contract cost averaged $4,350 per mile.

Summary

The availability of suitable equipment and experienced organizations must also necessarily be a consideration in the adoption of plant-mix construction. It happens that there are a considerable number of contractors in Michigan with such equipment and personnel who regularly bid on State work.

Mr. Schaub concludes his paper by saying: "It appears to us, therefore, that for our conditions the advantages of plant-mix construction outweigh the small extra cost. In other sections of the country where climatic conditions are more favorable or aggregates are more costly the situation may be entirely different."

Pumpcrete Practice

A new 96-page booklet on Rex Pumpcrete practice has recently been issued by the Chain Belt Co., 1666 W. Bruce St., Milwaukee, Wis. Prepared as a manual of concrete placement by the Pumpcrete method for contractors, engineers and operating men, this booklet answers the question "Is it a Pumpcrete job?" and if it is gives detailed information, with charts and diagrams, on the application of Pumpcrete to the work.

Copies of this Bulletin 375 may be secured direct from the manufacturer.

New Under-Structure On Dump-Truck Body

A new type of dump-truck body which has a patented trussed under-structure is now being made by the Hoist & Body Division, Gar Wood Industries, Inc., Detroit, Mich. This new Gar Wood under-structure provides direct full-length support to the floor by integral longitudinals in combination with new trussed-type cross members, resulting in a more rigid body, the manufacturer states. The sides and floor sections which form the body longitudinals are welded integrally, giving maximum strength to the floor in resisting shocks and sudden load impacts.

This trussed under-structure, which is claimed also to provide greater strength in the center area of the floor, is available with all types of the Gar Wood C line of bodies which are equipped with Models D6 and D7 direct-lift underbody hydraulic hoists and FICS patented cam and roller hoists.

The new Gar Wood under-structure for dump bodies.

Complete Line
of
DERRICKS
and
WINCHES

SAUGEN DERRICK CO.
3101 W. Grand Ave. Chicago, Ill.

Latest News on the Washington National Airport—

24 International TD-18's are Speeding it to Completion

The International TD-18 Diesels turn, mix, and dry the fill material. They also distribute and re-distribute it around the airport and into the runway bases.

America's largest airport and terminal, at Gravelly Point, Va., serving the nation's capital, is now being rushed to completion with the aid of 24 International TD-18 Diesel TracTracTors. These powerful crawlers have taken over this tremendous earth-moving job as a result of the outstanding performance of one of these units which went on the job a year ago.

When the new TD-18 hit the market early last year, the demand far exceeded the supply. As soon as the Northern Virginia Construction Co., Alexandria, managed to get one, they put it to work on the Washington Airport. Right from the start, the TD-18 became the most popular tractor on the field. Everyone wanted to use it. Unqualified statements made by those who got it, labeled the TD-18 as the *best tractor on the field regardless of size.*

It was natural, then, for 12 more TD-18's to get the call in February. Today there's a total of 24, owned by the Northern Virginia Construction Co.; L. B. Smith, Harrisburg; and the Capital Excavating Co., Highway Engineering Co., and Morauer and Harzell, Washington. There also are 2 International I-40 wheel-type tractors on the job.

See the nearby International industrial power dealer or Company branch for complete information on the TD-18 and the three other new International Diesels for your work.

Runways are rough-formed by the TD-18's which also mix the surface with plows, cultivators, and harrows.

INTERNATIONAL HARVESTER COMPANY
(Incorporated)
180 North Michigan Avenue Chicago, Illinois

INTERNATIONAL Industrial Power

Roadside Development On North Carolina Road

Contract for Widening, Flattening Slopes and Drainage on U. S. 70 Was Awarded to J. P. McGuire Constr. Co.: Contractor Commended for Work

✦ DURING the past several years, roadside development work on highways in North Carolina has been carried on by state forces under the supervision of the Landscape Engineer of the North Carolina State Highway and Public Works Commission. Recently, however, contracts for this work have been awarded.

In June, 1939, a contract was awarded to the J. P. McGuire Construction Co. and work was begun on a project in Durham County, in the central part of the state, on U. S. 70, between Durham and Raleigh, the state capital. This original road had been constructed of concrete for a width of 18 feet, and under this contract the existing road was widened on one side from 4 to 6 feet. On tangents the widening was 4 feet uniformly and was increased proportionately on spiralled curves. The project was 3.37 miles in length and cost approximately $56,500.

The outstanding feature of this work was the adoption of flatter slopes than are ordinarily used in North Carolina, on both fills and in cuts. Embankment slopes varied from 1½:1 to 5:1, depending on the height of the embankment. The flatter slopes were used on the shallower fills and were decreased in proportion to the height of the fills. In the cut sections, the steepest slopes are 1:1 for the heaviest cuts and on the lighter cuts the slopes are flattened to 5:1.

In the adoption of the variable slopes a special effort was made to carry out this transition in the changes of the slope gradually and in such a manner as to present the effect of easement. This was accomplished in a very satisfactory manner, due to the exceptional cooperation and interest on the part of the contractor, J. P. McGuire, and his superintendent. During the course of the work, great care was exercised in machining, drainage, sloping the borrow pits and, in cooperation with the Landscape Engineer, in the protection of trees and shrubbery along the highway.

Contractor Commended

Because of his unusual interest and cooperation on this roadside development project, the contractor, J. P. McGuire Construction Co. of Durham, N.C., was nominated for one of the 1939 Contractors and Engineers Monthly Roadside Development Awards by the engineers of the North Carolina State Highway and Public Works Commission. In making the nomination, these engineers stated that both Mr. McGuire and his superintendent, R. L. Hutchins, of their own accord manifested an interest and put forth efforts in excess of the Commission's regular requirements in order to preserve or to add to the appearance of the roadway slopes and the adjacent areas. Particular care was taken in preserving shrubbery and trees, in achieving a uniformity of slopes which blended into or conformed as closely as possible to the surrounding areas, and in the final dressing of shoulders, ditches and borrow pits.

J. W. Mills is State Construction Engineer for the North Carolina State Highway and Public Works Commission, Frank H. Brant is Landscape Engineer, and on this project, E. B. Gibbs was Resident Engineer, under T. A. Burton, Division Engineer.

Tractor to Rescue At World's Fair Show

(*Photo on page 40*)

The days just prior to the opening of any theatrical production are frantic and chaotic ones, and those preceding the opening of the American Jubilee, the very popular musical pageant of Americana at the 1940 New York World's Fair, were no exception. Not the least of the troubles for those in charge was the fact that the mechanism for operating the huge revolving stage needed changes in order to make it work properly. But those changes would require some weeks to complete, and in the meantime "the show must go on."

The day was saved by a humble tractor and bulldozer, owned by the World's Fair for work at the site of the Jubilee great outdoor theater. This International diesel crawler tractor was pressed into service to move the stage, the largest revolving stage in the world, as required for the action of the show. This turntable weighs 180 tons, has a circumference of 235 feet, and moves on two rails with a span of 21 feet 2½ inches. The various sets, arranged in the order of their use, are built in relief, from 40 to 45 feet high, and the front curtains weigh 8 tons apiece.

It is reported that the operator of the outfit, accustomed to the prosaic job of pushing dirt around, was in considerable of a flurry when he found himself working in the midst of a bevy of beautiful chorus girls, but in spite of the distractions, he and his tractor outfit never missed a cue, and scene followed scene according to schedule.

Now the electrical equipment is in working order and Westinghouse motors move the stage and the great curtains. The tractor and its operator have gone back to the mundane world and their usual tasks, but another tractor stands by as an emergency unit, in case the power should go off, or something goes wrong with the mechanism, for the producers know that in an emergency a good old tractor can save the day.

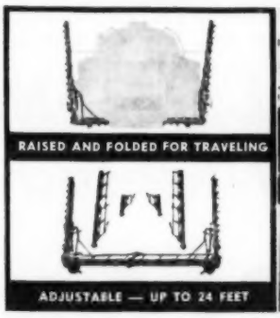
Barricades on Road Work Important Safety Measure

A new manual, designed to make highways safer for vehicles and pedestrians and to protect contractors and state and county highway departments from accidents to traffic where highway work is going on, has recently been issued by the Lumber Mutual Casualty Insurance Co. of New York.

This book, which is about 9 x 12 inches in size and is ring bound so that it opens flat, is amply illustrated with photographs of actual road-work conditions, with examples of right and wrong ways of barricading, and has short descriptions and explanations to accompany these illustrations.

Issued in the interest of greater safety on the highway, copies of this booklet may be secured without obligation by contractors and state and county highway engineers from Contractors and Engineers Monthly.

Here's the Spray Bar That
REALLY DOES THE JOB!



ETNYRE'S "SHUT-OFF-AT-NOZZLE" Spray Bar—starts spraying instantly . . . cuts off immediately . . . no drips, no skips, no leaks, no streaks! Individual valves at each pair of nozzles permit spraying through any two or more nozzles anywhere along entire length of spray bar. Shifts from side to side, raises or lowers, folds and locks for traveling. Get the whole amazing story in Etnyre's new "FOTO-FACTS" pictorial catalog. See your nearest dealer or write today to E. D. Etnyre & Co., Oregon, Illinois, U. S. A.

ETNYRE

BLACK TOPPER (Etnyre)
ROAD BUILDING SYSTEM

Small Jobs—**DUCK SOUP** *for the*
STRAYER PORTABLE CONCRETE PLANT

This Strayer portable concrete plant gets around. Makes 300 yards of on-the-spot concrete here then moves to next bridge.

TODAY this Strayer Portable *Concrete* Plant is making 300 yards of concrete for a little highway bridge. Tomorrow it will be making "on the spot" concrete 1½ miles away, for another and so it moves on to several highway bridges. This method of "blitzkrieg" concrete is a natural for any contractor who demands speed, quality and economy in concrete. It combines Loading Elevator—Storage Bin—Aggremeter—Cement Pre-Mixer—Cement Mixer—Water Tank and Meter, etc., all mounted on a husky trailer. Tell us about your concrete job, we'll tell you how you can lick it at a profit. Small jobs or large jobs—the Strayer Plant is a natural. Write for full particulars.

COSTS LESS THAN A TRUCK MIXER — the Strayer PORTABLE CONCRETE PLANT — 3 SIZES ½ YD · ¾ YD · 1 YD

ERIE STEEL CONSTRUCTION CO. · ERIE, PA.

Be sure it's the
GIANTGRIP T STRAIGHTEDGE
Either Steel or Aluminum
For Checking Concrete Surface
Two useable edges:—one sharp-cornered and squared for scraping; the other rounded for line-point straightedging.
ASK YOUR DEALER
L & M Manufacturing Co.
(Division of Mondis Forge Co.)
10302 BEREA RD., CLEVELAND, OHIO

A Hagen cable clamp in hook-up position on the tractor power take-off drum.

New Cable Clamps Save Time and Rope

In changing the cables on the large amount of cable-controlled tractor equipment used in construction, or in changing from one type of equipment to another, it is necessary to anchor the cables to the power take-off drum on the tractor. This requires from 10 to 15 minutes and usually results in the cables becoming bent and frayed on the ends after a couple of hook-ups, making it necessary to cut off a piece on the end before the cable can be threaded through the sheaves and anchored to the drum.

The new Hagen cable clamp, made by the Hagen Clamp Co., 522 W. 76th St., Los Angeles, Calif., is designed to minimize the time required to anchor the cable and in addition prevents fraying and bending, thus conserving the cable. Users of these clamps have reported that the change from one type of equipment to another can be made in one-fifth the time, and that it is no longer necessary to keep cutting off the frayed ends of the cable.

These clamps, which are available in sizes for the commonly used cable sizes, were developed by H. J. Hagen, a practical road-building contractor who has used them on his own equipment for about six months. Further information on Hagen cable clamps may be secured by those interested direct from the manufacturer by mentioning this item, or from this magazine.

New Generator Plant

The new Continental 100-kw electric generator plant, powered by two Model 33R overhead-valve-type Continental Red Seal engines, is a fully self-contained unit for completely automatic operation, the actual load requirements controlling the starting and stopping of the engines. When the operating load is within 50 per cent of its peak, only one engine is operating. When the load is increased to a point above the capacity of this one engine, the second engine automatically cuts in and picks up its share of the load. The engines are arranged for operation on natural gas, as well as for gasoline. The drive from the two engines is taken through individual automatic or free-wheeling clutches to a silent chain transmission unit, then through a common take-off shaft to the direct-coupled generator.

Each engine has 501 cubic inches displacement and develops 100 hp, providing together 200 hp when operating at 1,500 rpm. The chain transmission allows either a reduction or step-up in speed when required. As each engine can be operated individually, this type of construction has the advantage of economical operation. Also, if either engine needs adjustment or repair, the work can be done during the valley load without interrupting the service.

Complete information on the Continental Red Seal engines used in this set-up and on other Continental engines for the various power requirements on construction jobs may be secured direct from the Continental Motors Corp., Muskegon, Mich.

Heavy-Duty Trucks

Four new heavy-duty models, in rated capacities from 3½ to 7½ tons, have been announced by the Federal Motor Truck Co., Detroit, Mich. The new Federal Model 35, rated at 3½ to 5 tons, fills in a gap in the Federal line, while the other models include Model 45, 4 to 6-ton models, the 55, rated at 5 to 6½ tons, and the 55H, of 5 to 7½ tons. All are powered by Waukesha engines and are equipped with a W. C. Lipe 13-inch single dry-plate clutch, a Clark 5-speed transmission, and Timken axles.

The construction features introduced by Federal last year on the super-heavy-duty 60 Series trucks have been incorporated in all of the new models announced this year, including the Model 35. The frames are 10 inches deep, Models 35 and 45 have bevel-drive rear axles and the 55 and 55H have double reduction drive.

STERLING BALANCED WHEELBARROWS

All trays have double thickness at corners. Both laps are crimped over a continuous butt-welded reinforcing rod.

NO. S-12—FOR DRY MATERIALS WITH PNEUMATIC TIRE WHEEL

NO. S-18—FOR CONCRETE

A COMPLETE LINE OF STERLING WHEELBARROWS AND CONCRETE CARTS

STERLING WHEELBARROW CO., MILWAUKEE, WIS.

20 Year Old Buckeye Model 260 Makes Trenching History

Large North Outfall Sewer Near Sepulveda Dam Trenched in Record Time—

Three views are shown of the 20 year old model 260 Buckeye making trenching records on the San Fernando Valley North Outfall Sewer rerouted around the Sepulveda Dam. Artukovich Brothers, contractors. Trench from 6½′ to 8′ in width and 23′ to 31′ in depth was excavated at the rate of 300 to 400 lineal feet per 8-hour day. Buckeye Trenchers are not only fast—they're faster!

Makes 400 Lineal Feet of 31′ x 8′ Trench in 8 Hours!

Artukovich Brothers, contractors, rerouting the sewer around the Sepulveda Dam, used a Buckeye Model 260 Trencher that was about 20 years old. Yet, despite the trencher's age, box car figures are needed to describe the ditching record made.

Here, up to 400 lineal feet of trench 31′ deep and 8′ wide was excavated in a single 8-hour shift. Day after day, over 300 feet were trenched witnessing the inbuilt stamina, ruggedness of construction and design qualities common to all Buckeye Trenchers old and new. New Buckeyes will do even better.

Regardless of your trencher needs, there's a record-breaking Buckeye just suited to your requirements — both wheel and boom type machines, each assuring clean, accurate grade trench, faster and at lowest cost, figured any way.

For added profit and record-making trenching speed—check Buckeye first!

Buckeye Clippers provide Mavac Effortless Vacuum Control; speed digging and handling; full swing; simultaneous hoist, swing and travel; ready convertibility to trench hoe, crane, drag line or pile driver; low operating and maintenance costs.

Buckeye

THE BUCKEYE TRACTION DITCHER CO. FINDLAY, OHIO

Makers of Trenching Machines, Convertible Shovels, R-B Finegraders, Surface Graders, Spreaders and Tractor Equipment

Distributors in All Principal Cities

Check Buckeye First!

Arizona Reorganizes Highway Maintenance

New State Highway Set-Up Eliminates Political Jobs; Results in Efficiency And Improved Work

By W. R. HUTCHINS, State Highway Engineer, Arizona Highway Department

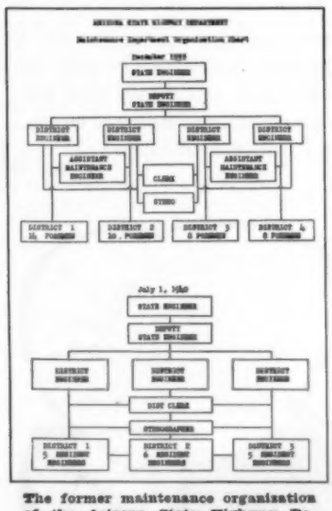
✦ THE present highway system in Arizona actually had its start prior to statehood, when the Territorial authorities approved a tentative system embracing 1,500 miles of road. When this authority expired in 1912, the Territorial Engineer had improved 108 miles of this system, at a cost of $600,000, including maintenance. Today the Arizona State Highway Department has jurisdiction over 3,614 miles of highways, including about 2,469 miles improved to a dustless standard and built at a cost totaling about $91,000,000.

Old Maintenance Set-Up

Under the former Maintenance Foreman System, the state was divided into some forty sections, under four district engineers and two assistant maintenance engineers. Some of these sections were only 50 to 75 miles long and each had a foreman and as many as eight to ten men working in them.

The main reason that this maintenance foremen system was not efficient was that the forty maintenance foremen jobs, paying $200 a month with car and gasoline furnished, were regarded as political jobs by every one concerned. As a result, forty new men were usually placed in these jobs every two years. Although many of them were good men, they were picked from vocations which gave them no training in the maintenance of roads. Thus, roads built in accordance with the most modern road-building designs and methods and costing as high as $50,000 a mile for concrete pavement, were turned over to untrained men to maintain, in spite of the fact that highway engineers all recognize that maintenance of highways is just as important to the highway system as building them.

In March, 1939, when the present Arizona Highway Commission took office, this system was explained to the Commission and the economic features of a new and more efficient system outlined for them. They gave their approval to put it into effect. Great credit must be given to Governor Jones and to the Highway Commission, as they endured a storm of protest against the abolition of forty political jobs.



The former maintenance organization of the Arizona State Highway Department and, below, the new set-up for greater efficiency and economy.

New System

Under the revised system, the state has been divided into sixteen residencies or sections under three district engineers with no assistants. Each residency, averaging about 225 miles of highway, is headed by an engineer who has charge of all activities in the residency, under the District Engineer, thus tying in very closely construction and maintenance.

These resident engineers established headquarters in most instances close to the center of their residencies but in some cases, due to the sparsely populated districts, the resident's office was established at the best available place to live even though it was at the end of the residency instead of in the middle. While this is not ideal, it does not take long to reach the farthermost section of any residency, and merely means that the engineer travels a few more miles in his car than the one who is located in the center of his section.

Permanent maintenance camps have been built in the most strategic locations within these residencies for housing the oil men, truck drivers, and laborers, in order to minimize the miles traveled to and from work each day. This force, exclusive of supervising personnel, averages one man for each 12 miles of highway.

Savings

The 1938-1939 budget, under the old system of maintenance, showed a total of $1,428,000 for maintenance. When the 1939-1940 budget was made up under the new system of maintenance, a total of $1,164,115 was set up for maintenance. This was, of course, an estimate, but the year this system has been in effect has shown that this sum is adequate for maintenance. However, it has also indicated that the distribution among the residencies needs some revision, due to the fact that the condition of the roads in some sections requires more money per mile. This saving of the new maintenance system compared with the old means that $263,885 can be put into new construction.

This change in set-up not only affected maintenance work but, owing to the new close relation to construction, naturally affected the engineering percentages for supervision on construction. The sixteen resident engineers now have general supervision of all construction projects in their residencies, instead of only one project. With this general engineering supervision reflected from the district engineers through these sixteen resident engineers, the engineering supervision on each construction project can be curtailed.

This saving is shown by a comparison of the periods of July 1, 1938 to December 1, 1938, under the old system, with a similar period between July 1, 1939, to December 31, 1939, under the new system. The latter shows a saving of $16,336.95 or minus 8.18 per cent, in spite of the fact that $469,051.69 or 28.64 per cent more work was submitted on contractors' estimates during the latter period.

Conclusion

In comparing maintenance costs in 1912 with the present, we find that the Territorial Engineer during his 3-year tenure of office spent about $600,000 on 108 miles of newly constructed road and for maintenance. Of this amount, 97 per cent went for construction and 3 per cent for maintenance. He had in 1912 the grand total of 1,852 registered motor vehicles and a large number of horse-drawn vehicles to provide roads for. The average construction and maintenance costs for the ten years previous to June 30, 1939, is 74 per cent for construction, 22 per cent for maintenance and 4 per cent for betterment, with 139,072 motor vehicles registered in 1939.

We can safely assume that the 19 per cent increase over our 1912 maintenance costs is due mainly to increased travel by more and heavier equipment and more intensified maintenance. In 1912 motoring was chiefly a week-end adventure. The intervening discomfort resulting from bruised bodies, in addition to the time required to gain sufficient courage to tackle a second trip, had a very saving effect on roadway surfaces.

Today the traveling public, with little or no restriction, can travel at will at any time and in any direction without encountering discomfort or obstacles of any kind.

Temperature Control For Asphalt Plants

A new broadside N-33, recently issued by Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, Penna., depicts and describes briefly the complete line of L&N industrial temperature-measuring instruments. Micromax and other types of pyrometers are included, as well as information about the types of plants for which they are suited.

Copies of this broadside N-33 may be secured direct from the manufacturer.

PILE HAMMERS and EXTRACTORS
HOISTS–DERRICKS WHIRLERS
•
Special Equipment
Movable Bridge Machinery
•
Write for descriptive catalogs.
McKIERNAN-TERRY CORP.
19 Park Row, New York
Distributors in Principal Cities

CONTRACTORS BARROWS
with Round Fronts
Type M-11

The only barrow with tray having double folded corners and three thicknesses of steel at folds, and non-leakable
MANUFACTURERS OF: WHEELBARROWS • LAWN ROLLERS • CONCRETE CARTS • DRAG SCRAPERS • MORTAR PANS • MORTAR MIXING BOXES
Write for Catalog 40C
JACKSON MANUFACTURING COMPANY, HARRISBURG, PENNSYLVANIA

If you want power for tough digging—
you want speed—
you want a bigger day's work than any similar bucket can give you—
TRY the KIESLER Digging Bucket!
Jos. F. Kiesler Co., 936 W. Huron St., Chicago, Ill.

SHUNK SCARIFIER SAW-TOOTH BLADES
CUT THRU WHERE OTHERS STALL
PATENT APPLIED FOR

Use these blades where you previously have had to use a scarifier.
Get the even distribution, possible only with a blade, yet penetrate the hard surfaces.
Increase the usefulness of your motor graders, bulldozers, under-truck-maintainers, road drags, snow plows and other maintenance units. No extra parts are required; you simply replace the blade you are now using with a Shunk Saw-Tooth Blade.
Made in varying sizes, with angle and spacing of teeth according to the work to be done. Blades with two cutting edges are available in any combination of saw-tooth or plain edges for DOUBLE DUTY.
Here is big profit for a small investment—write at once for complete information on practical uses and prices.
★ SHUNK MFG. COMPANY ★
BUCYRUS, OHIO, U.S.A.

The Little Giant Hydro mower.

New Highway Mower Has Twin Sickles

One of the features of the new Little Giant Hydro mower, made by Little Giant Products, Inc., Peoria, Ill., is its twin sickles which operate like a pair of shears and will cut anything, including cornstalks, hedge and similar tough growths as well as grass and weeds. It is claimed that these sickles automatically sharpen themselves as they cut.

This new highway mower, which is adaptable for use with any cultivator-type tractor, is hydraulically controlled. The cutter bar may be placed in any position, vertical, horizontal or at any angle up to 45 degrees below horizontal, and the sickles always work at the normal cutting speed. The driving head may be placed vertically at any necessary position and the sickle bars tilted face downward or upward, as desired. These operations are all independent, providing flexibility and a wide range of cutting angles.

The sickle bar is mounted far forward on the tractor to provide complete visibility by the operator at all times, and is guided by the front end of the tractor. Should the bar strike an obstruction, the sickle bar yields, a pin is sheared and the motor is automatically stopped. There are no gears in the Little Giant and the few working parts are enclosed and run in oil. The sickle bars are quickly and easily attached or detached, simply by putting in or removing three bolts.

Further information on these Little Giant Hydro highway mowers may be secured direct from the manufacturer by mentioning this item.

Rock Bit Grinders

The Massco Junior rock bit grinder, made by the Mine & Smelter Supply Co., Denver, Colo., is designed for the user of a limited number of detachable rock bits, providing an efficient and economical means of sharpening these bits in the contractor's shop right on the job. It is stated that anyone can soon learn the few easy steps of grinding the gage to the correct angle and sharpening the cutting edges. With a little experience, bits can be accurately ground in two or three minutes per bit.

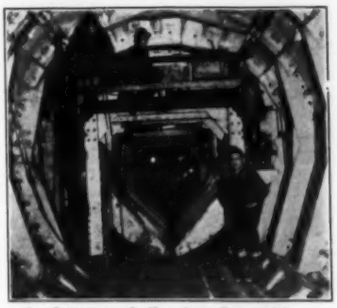
The Massco Junior is furnished as a complete unit or as attachments to fit on any bench or pedestal grinder. The complete unit includes the bit grinding attachments, a belt-driven grinder head and Norton grinding wheels mounted on a cast iron base. Measuring only 36 inches wide, 20 inches deep and 15 inches high, the complete grinder is compact and occupies but little bench space. It is built in compliance with the American Engineers' Standard Safety Code, so that the operator is fully protected in case of wheel breakage. A wick oiling system provides the spindle bearings with an ample supply of oil at all times.

Complete information on these Massco Junior rock bit grinders is contained in literature which the manufacturer will be glad to send on request.

Concreting Operation For Tunnel Lining

While continuous concreting for tunnel lining is not new, it has not been a common procedure on Eastern projects. However, the Associated Contractors, Inc., is employing this practice on 18,850 feet of the Delaware River Aqueduct.

Blaw-Knox steel forms are used on this 15-foot diameter section of the Aqueduct, and over 1,000 cubic yards of concrete has been poured a day, in three 8-hour shifts. The linear production has averaged about 240 to 260 feet a day, occasionally reaching 300 feet. A total of 280 feet of B-K steel forms, in 20-foot sections, has been used for the continuous concreting operations. These forms are of the three-quarter-round telescopic type, the traveler is self-propelled by means of an electric motor drive, and the jacks for supporting the collapsed forms are hydraulically operated from a central electric pump.



A close-up of the traveler, with a section of the Blaw-Knox forms collapsed for telescoping, on Associated Contractors' section of the Aqueduct.

Blaw-Knox steel forms are also being used on the S. A. Healy contract on this project, and a number of other form set-ups are being fabricated at the shops of the Blaw-Knox Co., Pittsburgh, Penna., for other contracts.

EQUIP YOUR ASPHALT PLANT with a MADSEN PUG MILL

MADSEN mixers have a reputation for longer life and faster operation. They mix and discharge faster. Mixer wearing sections and paddle tips made of high-test white iron. Broad-faced steel cut tooth timing gears. Mixer shafts of high tensile steel and real built-in value assure the operator of the lowest possible operation cost. Horse-power requirements are low because these mixers are scientifically designed.

500 lb.—1000 lb.—1500 lb.—2000 lb.—3000 lb.—4000 lb.—and 6000 lb. capacities.

The MADSEN PUG MILL is the one you need on your job.

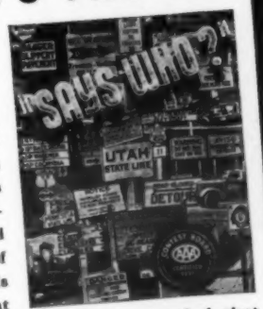
MADSEN IRON WORKS

HUNTINGTON PARK, CALIFORNIA

NATIONAL 1ST LEADER . . . by popular vote

CHEVROLET TRUCKS ..for 1940

Get your copy of Certified Facts about CHEVROLET'S PROVED ECONOMY



Ask your Chevrolet dealer, or write to us, for your copy of "Says Who?"—a 16-page book that gives the facts about truck operating costs, facts certified by the Contest Board of the A.A.A. We printed this booklet for *you*—so that you might have authoritative evidence as proof of what Chevrolet trucks can do, and what they cost to operate and maintain.

For the 6th time in the last 8 years, the nation's truck buyers, by their orders, have awarded to Chevrolet first place in truck sales.

Official 1940 registrations tell the story. The latest figures (for the first five months) show 84,167 Chevrolet truck registrations. That is 15,196 more than for the make in second position, and 53,163 more than for the third place make. Incidentally, it's a gain of 10,042 units for Chevrolet over the corresponding figures for 1939.

Chevrolet is the leader in sales because truck buyers are *wise* buyers—because they chose the truck that leads in earning power, in reliability, in value.

CHEVROLET MOTOR DIVISION
General Motors Sales Corporation
DETROIT, MICHIGAN

The new Griffin generator.

New Line of Portable Electric Generators

A new line of portable gasoline-engine-driven generators, designed particularly for the operation of all types of electrically driven tools as well as for lighting systems on construction jobs, has recently been announced by the Griffin Equipment & Supply Corp., a subsidiary of the Griffin Wellpoint Corp., 725 E. 140th St., New York City.

The engine used on these units is of the 4-cycle heavy-duty type, mounted to eliminate vibration. The generator is driven through a flexible coupling and operates at medium speeds. It is of double ball-bearing construction, designed for trouble-free service under extreme operating conditions. All units are available with a metal housing equipped with ventilating louvres for weather protection. Each generator has a multiple outlet box with three Hubbell twistlock receptacles to provide for the use of several tools at one time. The two-wheel pneumatic-tire mounting is designed to provide a light-weight well-balanced easily portable unit.

These generators are being offered for sale through dealers having exclusive territories, and there are still some territories open. Further information on these generators may be secured by interested contractors, state and county highway engineers, and distributors direct from the manufacturer by mentioning this item, or from this magazine.

Improved Efficiency In Spark Ignition

Ignition engineers concede that ideal ignition is one where a spark of constant intensity is produced both at the highest operating speeds and at low speeds for starting purposes. The battery ignition system produces a fine starting spark but as the speed increases this voltage drops. The conventional magneto has its least spark output at low speed, but increases its output indefinitely with increased speed. To eliminate the inadequacies and combine the advantages of each system, Wico Electric Co., Springfield, Mass., has developed the Electromag, a magneto for trucks, buses and tractors which is aimed to give longer contact life and easier starting.

The Wico Electromag develops four, six, or eight sparks per revolution, thus producing the necessary number of sparks to operate at camshaft speed, and does this with a design no more complicated than the conventional type magneto.

Complete information will be found in Form S-88 which will be furnished by the manufacturer free of charge.

New Heavy-Duty Hand Saw

The 12-inch Speedmatic saws made by the Porter-Cable Machine Co., Syracuse, N. Y., are now available with 3-phase 220-volt electric motors, thus equipping these saws with ample power for heavy-duty cutting. Also available is a radial arm in which this Speedmatic saw may be used, so that the unit serves not only as an electric hand saw but also as the power unit in an over-arm saw capable of cross cutting and ripping at any angle or compound angle.

Literature describing these Speedmatics may be secured by interested contractors and state and county highway engineers direct from the manufacturer by mentioning this magazine.

Useful Attachments For Motor Graders

The motor grader has become one of the most useful tools of the highway maintenance engineer. In order to increase still further the service of this powerful tool, numerous attachments have been developed. Caterpillar Tractor Co., Peoria, Ill., in Form 6087, describes a new group available for various models of Caterpillar motor graders.

These attachments include a shoulder finisher which fits flush on the end of the standard blade giving a 6-foot blade extension with a 3½-foot adjustable wing. A front-mounted pusher blade, 10 feet long and 30½ inches high, is operated by the same frame and lifting mechanism used on the V-type snow plow with which the grader may be equipped. A snow wing is another attachment.

These graders are also being equipped with all-steel cabs, double steel doors, an automotive type hot water heater and a full set of electric lights. Scarifiers with removable-point teeth, an odometer to give an accurate record of the miles traveled, standard blade extensions for regular maintenance work, multiple-blade attachments comprising a series of nine short parallel blades, and a tire pump attached to the engine, complete the attachments which add to the service of motor graders as described in the folder mentioned above.

Removing Oil and Dirt From Compressed Air, Gas

The operation of the Aridifier, a device which removes moisture, oil and dirt from compressed air and gas by centrifugal force, is explained in detail in Bulletin 340 issued by the Logan Engineering Co., 4912 Lawrence Ave., Chicago, Ill. With this device, moisture, dirt or oil is impinged upon the vanes of four aluminum rotors, mounted on bearings. Alternate rotors move in opposite directions, driven by the air or gas without appreciable back pressure. The impinged matter is thrown outward by centrifugal force to the housing wall where it runs down and out through an outlet to a trap.

Application and installation details are given on all sizes from ⅜ to 10-inch and pictures of representative installations are shown. Copies of this bulletin may be secured direct from the manufacturer by mentioning this item.

A 1-HP Gas Engine

A 1-hp 4-cycle water-cooled gas engine, said to be the smallest such unit on the market, is being manufactured by The Lauson Co., New Holstein, Wis. This Lauson RCR engine has a rope starter, a counterbalanced crankshaft for smooth operation, a flyball governor and magneto ignition. If it is desired to use the engine for lighting purposes, a lighting coil may be incorporated in the magneto as extra equipment.

A machined pad on the drive shaft side permits the direct mounting of pumps, generators, or blowers, and 4 to 1 and 6 to 1 gear reductions are available as extra equipment. Other extra equipment on this unit include radio shielding and a kerosene carburetor. For engines of a special nature requiring extra light weight, special crankshafts, special gasoline tanks and similar details, the factory will be glad to furnish quotations. The outfit has a positive pump and splash lubrication system, a Moss type air cleaner, and is finished in green enamel.

New Excavator Control

Bulletin X-60, recently issued by the Harnischfeger Corp., 4419 W. National Ave., Milwaukee, Wis., describes the new control system which this company is installing on its ⅜, ½ and ¾-yard excavators. In this P & H control, each clutch and brake is operated by its own master cylinder on hand levers or foot pedals. Pressure applied to brakes and clutches is in direct ratio to the pressure applied by the levers or pedals, and this more direct action is said to enable the operator to "feel" the load at all times.

Copies of Bulletin X-60, containing photographs and diagrams to illustrate the features of the new P & H excavator control, may be secured direct from the manufacturer.

Most conspicuous at the construction of Chicago's South Side filtration plant is the concrete plant with B-G 250' belt conveyor feeding aggregate. Another Barber-Greene job proving that

Steel is Cheaper than Wood

The Conveyor was furnished complete—machinery, motors, belt, idlers, steel sectional trusses, A-frame supports. The B-G steel frame is correctly aligned and retains this alignment—insuring prolonged belt life. The whole set-up can be lengthened, shortened or moved to a new location. Longer spans are possible and fewer bents are needed, thus avoiding unnecessary ground obstructions.

● Let Barber-Greene engineers show you methods of cutting material handling costs. 5-22

BARBER-GREENE
AURORA ILLINOIS

Are You Tired of Pump Headaches?

Marlow Pumps give continuous and genuine satisfaction. Sizes 1½" to 10" self-priming centrifugal. Also diaphragm and plunger pumps.

Ask for Bulletin CEM-42

MARLOW PUMPS
Ridgewood New Jersey

MARMON-HERRINGTON *All-Wheel-Drives* **HAVE "What It Takes"**

● "What it takes" for snow removal service is *sure-footedness.* Power and traction on all the wheels of a truck make other slipping, sliding vehicles look like "weaklings" when the snow comes down and the drifts pile up.

"Our Marmon-Herrington *All-Wheel-Driven* Fords keep the roads clear of snow at one-third previous cost," says one road superintendent. "It would take a mighty tough winter to block us, now," says another. "I am still amazed at the performance of our Marmon-Herrington," writes still another.

But that isn't all. The same *All-Wheel-Drive* vehicles that plough relentlessly through deep drifts in winter, perform just as remarkable feats in mud, sand and loose dirt during other seasons of the year—cutting hauling costs "to the bone," and doing jobs no other trucks can do. For road-building, as well as for road maintenance, they are supreme. Prices are surprisingly low. Send for bulletins. Cable address MARTON, Indianapolis, Indiana, U. S. A.

MARMON-HERRINGTON COMPANY, INC.
INDIANAPOLIS, INDIANA, U.S.A.

Lubrication Habits Affect Machine Life

Selection of Right Type As Well As Good Grade of Lubricant for Each Part Is Essential

Part I

+ MATERIAL handling by excavating and construction equipment is contingent upon machinery performance. Given a power shovel properly maintained and lubricated, one can expect much better performance and yardage, for maintenance and lubrication are definitely related. The more effective the latter in preventing wear, the lower will be the costs to maintain or renew parts which may be affected by wear.

A severe duty is always imposed upon all types of excavating equipment, due to the fact that they are subjected to exposure to dust, dirt, rain, mud, or snow. So the possibility of rusted or corroded mechanisms is a factor which must be counteracted by lubrication. As there is so close a relationship between wear and parts deterioration, the protective ability of the lubricants employed should be uppermost in the thoughts of the purchaser.

In this connection, he is concerned with certain basic mechanisms which of themselves are not difficult to lubricate. Collectively, however, they may present a problem because the operating conditions may differ widely. For instance, some gears are exposed while others are housed. They may be carrying quite similar tooth loads, but the exposed units require a heavy adhesive lubricant which will stick and resist the effects of weather, water-wash, and centrifugal force. The housed gear sets, however, can usually be served with an S.A.E. 90 or 140 gear lubricant.

Some operators use the same steam cylinder oil required for their steam cylinders when dealing with steam power. This brings us to a discussion of the various types of these lubrication requirements.

Steam Cylinder Lubrication

Steam pressures on excavating equipment in field service range around 150 pounds per square inch. There is usually considerable condensation, due to the exposed nature of many of the steam lines; but by taking steam from the highest part of the boiler and proper application of insulating pipe covering, this can be reduced. Yet even with these precautions, the steam as delivered to the engine is usually relatively wet. Cylinder condensation will also be prevalent where engines operate intermittently.

The amount of water which accumulates above a throttle valve prior to starting an engine depends upon the length of time it has been stopped. Admission of these slugs of water tends to wash the oil from the cylinder walls and, until renewed, insufficient lubrication will result, with scoring and abnormal wear. If not corrected, compression losses will develop, with inefficient operation of the entire machine, due to steam leakage past the piston rings. Groaning of the engine or rattling of the valves on their seats are signs of abnormal wear, which decreases the power available and leads to increased fuel consumption.

All this can be prevented by the use of cylinder oils which contain sufficient compound or animal fat to give the required tenacity to the lubricating film, and possess adequate viscosity to withstand the prevailing cylinder temperatures. An oil having a viscosity of approximately 150 seconds Saybolt at 210 degrees F., with from 6 to 8 per cent of compound, should develop a film of lubricant which will resist the washing action of any water which may be present.

Steam cylinder oils should be fed into the steam line at a point from 4 to 6 feet back from the throttle valve, although oil may have to be delivered to the crowd engine at a point further back. A hydrostatic or mechanical force-feed lubricator is used for this purpose. The latter is more positive and economical since it operates with the engine. A suitable atomizer to effect thorough atomization of the oil and impregnation of the steam is also necessary.

This is where the steam itself becomes an adjunct to cylinder lubrication, as it becomes the carrier to bring about the most thorough distribution of oil to all moving elements inside the valve chambers and cylinders.

Selecting the Oil

Steam cylinder oils for construction equipment must be comparatively heavy in body, as indicated by the viscosity range mentioned above, and adhesive in nature to insure the maintenance of a lubricating film which will resist the wearing or scraping action of the valve and piston-ring surfaces and the washing effect of wet steam.

An oil which contains a sufficient amount of high-grade animal or fixed oil to promote the formation of an extremely tenacious film of emulsified

(*Concluded on page* 32)

Lubrication Tables for Construction Equipment

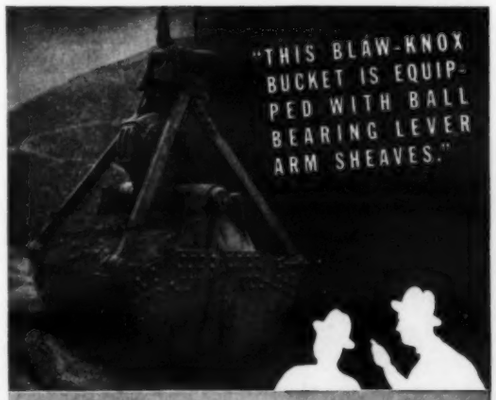
Prepared by A. F. Brewer, Technical and Research Division, The Texas Co.

OIL LUBRICATION

Type of Operation	Viscosity Range Sec. S.U. at 100° F.	Viscosity Range Sec. S.U. at 210° F.	(Lubricant Characteristics) S.A.E. No.	°F. Pour Test	Carbon Residue by Conradson Test	% Compound
STEAM CYLINDERS						
For saturated steam above 150 lb.	.....	165-220	.....	45-65	.....	4-5
For saturated steam below 150 lb.	.....	100-150	.....	60-70	.....	6-8
BEARINGS						
Plain bearings (oil lubricated)	150-300	.....	10-20	0 to 10	.....	.....
DIESEL ENGINES						
According to mfr. specs.	500-2300	53-95	.....	0 to 15	0.05-0.50	.....
GASOLINE ENGINES						
According to mfr. specs.						
Cold weather (below 40° F.)	160-600	44-65	10-30	0 max.	0.03-0.40	.....
Warm weather (above 40° F.)	850-2000	75-125	40-60	0 to 10	0.60-1.20	.....

GREASE LUBRICATION

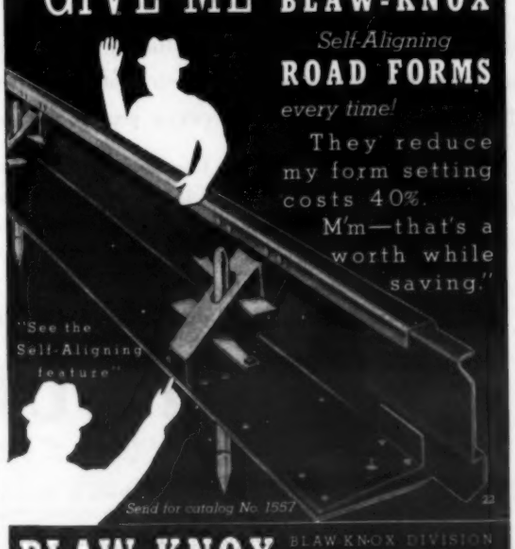
Type of Operation	Consistency (Measured by Penetration)	Melting Point °F.
Plain Bearings (pressure fittings)	200 to 300	215 to 315
Ball or roller bearings	200 to 250	275 or above
Chassis parts	250 to 350	200 or above
Link pins and rollers (grease lubricated)	250 to 350	200 or above



As a matter of fact this feature is standard equipment and does not cost more. It is especially desirable where the bucket handles loose granular materials because it keeps lubrication in and dirt out. This and many other desirable features of Blaw-Knox Buckets is fully described and illustrated in Bulletin No. 1606. Write for it today.

BLAW-KNOX Digging and Rehandling BUCKETS
BLAW KNOX DIVISION OF BLAW-KNOX CO. Farmers Bank Bldg. Pittsburgh, Pa.

"GIVE ME BLAW-KNOX Self-Aligning ROAD FORMS every time! They reduce my form setting costs 40%. M'm—that's a worth while saving."



Send for catalog No. 1557

BLAW-KNOX Self Aligning ROAD FORMS
BLAW-KNOX DIVISION OF BLAW-KNOX CO. Farmers Bank Bldg. Pittsburgh, Pa.

You can bid low to get the good jobs... yet make money...

—with HEIL Dig-N-Carry Scoops

Heil Dig-N-Carry Scoops take the "guesswork" out of your dirt-moving estimates. Here's equipment you know you can depend on to see even the toughest jobs through on time — at real savings — thanks to famous Heil Quality construction. You're able to bid low and get the good jobs . . . do the clean-cut work that boosts your reputation. Equip yourself with Heil Dig-N-Carry Scrapers . . . Write today for free Heil Road Machinery catalog.

★

Left: Heil Hydraulic Bulldozers are sturdy — fast — dependable.

★

Below: Powerful, smooth operating Heil Dig-N-Carry hydraulic scrapers cut dirt moving costs to the bone.

THE HEIL CO.
MILWAUKEE, WISCONSIN HILLSIDE, NEW JERSEY
HEIL Quality

Clean Equipment Aids in Repairs

West Virginia Reports That Regular Inspection And Careful Cleaning Keep Units in Condition

By E. L. WORTHINGTON,
Maintenance Engineer, State Road Commission of West Virginia

✦ WEST VIRGINIA is divided by the State Road Commission into ten districts for maintenance, and the maintenance equipment, as far as practical, is allotted on a road-mileage basis. There is also a certain amount of state-owned construction equipment which is allotted to the Prison Labor Division.

The organization responsible for keeping the equipment in good repair consists of a General Superintendent of Equipment and Supplies, a General Superintendent of Equipment, an Assistant Superintendent of Equipment, ten district superintendents of equipment, and a Superintendent of Equipment for the Prison Labor Division. This directing organization which comprises the Equipment Division of the State Road Commission is under the direct supervision of the State Maintenance Engineer.

The General Superintendent of Equipment and Supplies and his central office assistants write all specifications for new equipment, and personally check all equipment which is to be given a major overhaul. Such an overhaul is defined as the complete disassembly of a piece of equipment from one end to the other, and the replacement of all worn parts so that the machine, when reassembled and painted, is for all practical purposes as good as new.

The actual overhaul work, together with unusual mechanical repair work, is all done in the district shops under the immediate supervision of the shop foremen who report to the District Superintendent of Equipment. The Central Office force has only general supervision over this repair work.

Equipment Inspection

The Equipment Superintendent in each district is responsible for the inspection and work done by the shop in his district. He and the County Maintenance Superintendent decide when a unit should be taken to the shop for repairs. A job order is then written covering the proposed repairs. When the work is completed, a copy of the job order, showing labor and materials, is sent to the County Maintenance Superintendent for his approval, both for cost and satisfactory workmanship. A copy also goes to the Chief Clerk of the district for posting to his equipment cost ledger, from which the annual operating cost is compiled.

All materials are charged to the supply account and charged out only when actually used. This prevents any materials being charged to a unit until they are used. The reason for this procedure is twofold: first, it maintains a record of material available for use, which helps to control inventories; and second, it provides a true operating cost as far as materials are concerned.

Each piece of equipment is carefully inspected quarterly and a copy of an individual report is sent to the Central Office where its contents are posted on the perpetual inventory record, which is a complete record, by districts, of all the equipment in the state. The information in this perpetual inventory record serves as a guide in approving requisitions for parts. For example, should a requisition come in for some $200 worth of parts for a certain piece of equipment, a reference to the perpetual inventory record indicates whether or not the expenditure is justified.

Another individual equipment record card is carried in a special pouch on each piece of equipment. When the District Equipment Superintendent inspects a piece of equipment, he signs this card, showing the date of inspection. He also reports to the Central Office on another form in order that the Central Office may know that these inspections are being made, and the condition of the equipment.

District Shops

A district shop is located at each of the ten district headquarters, and one is provided for the Prison Labor Division. The work in each of these shops is under the direction of a shop foreman who reports to the Equipment Superintendent.

All major overhauls and extraordinary repairs are made in the district shops. Minor repairs are made by the county maintenance mechanics, one of which is located in each county of the state. The county maintenance mechanic may make a major overhaul in the county headquarters shop, but only with proper authority from the District Equipment Superintendent and the Central Office.

When a unit is brought into the district shop for repairs or major overhaul, before any work is started, it is thoroughly cleaned with a Hypressure Jenny, using a good cleaning solution. This cleaning of equipment prior to the start of work has done much toward expediting the work of the mechanics, because a mechanic can do much more efficient work with clean hands, clean tools and clean parts to work on. Furthermore, flaws or breaks in plates or castings, which become discernible in clean surfaces, might otherwise not be found.

Each of the district shops is equipped with two electric welding units. One unit, electrically driven, remains in the shop for shop use only. The other, driven with a gasoline engine and mounted on a truck chassis, is used in the field for work which is either of an emergency nature or which cannot economically be brought to the shop.

Interest of Men Important

We have found that the man who can do the most toward cutting the operating cost of equipment is the operator himself. Therefore, the State Road Commission of West Virginia concentrates on developing individual personal interest among its operators.

Aeroil OIL BURNING CONTRACTORS' EQUIPMENT
• KETTLES FOR TAR, PITCH & ASPHALT • EMULSION DISTRIBUTORS • POWER SPRAYS • LEAD MELTING FURNACES • WEED BURNERS • TORCHES & BURNERS
Send for FREE Bulletin No. 100-C
Aeroil Burner Co., Inc.
West New York, New Jersey

Heavy-duty tires, dual rear wheels and other special equipment shown are extra

A FORD ON YOUR JOB
means money in your pocket

There are a number of ways to look at truck economy. First cost is an item. Operating and up-keep costs are important. But there's still another angle that deserves sharp examination. It's this:

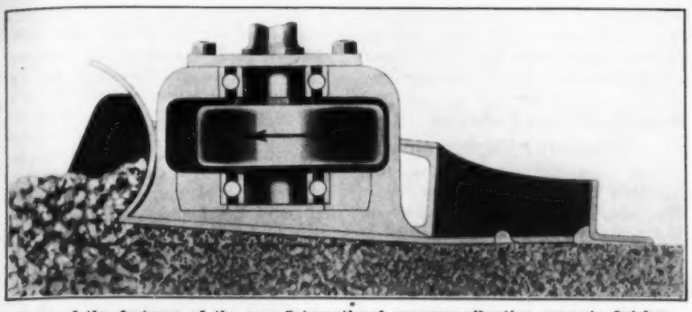
Ford units are fast, easy to handle, sturdily built. You can haul a big load swiftly, keep high speeds when necessary, and thus, by cutting down the amount of time spent on a given job, you can keep the unit profitably at work more hours per day. That means money in your pocket. Try a Ford on your job. Ask any Ford dealer about an "on-the-job" test.

FORD TRUCKS

FORD MOTOR COMPANY, BUILDERS OF FORD V-8 AND MERCURY CARS, FORD TRUCKS, COMMERCIAL CARS, STATION WAGONS AND TRANSIT BUSES

Visit the new Ford Expositions at the two Fairs, New York and San Francisco, 1940

Ford



Some of the features of the new International pressure-vibration concrete finisher.

New Finisher with Pressure Vibration

A new type of concrete finishing machine embodying the principle of simultaneously applying pressure and high-frequency vibrations to a mass of concrete and finishing the surface to the required height and contour has recently been announced by the International Vibration Co., 16702 Waterloo Road, Cleveland, Ohio.

In the design of this machine, the opening in the front to receive the concrete is of greater capacity than the rear or finishing end, thus automatically producing a downward pressure as the machine moves forward against a constantly maintained head of concrete. High-frequency vibrations are at the same time applied in a horizontal direction, resulting in a dense concrete with a hard wearing surface free from tendency to scale or spall, according to the manufacturer. Greater uniformity of concrete is obtained through the synchronizing of the vibrations to the forward movement of the machine, each foot of concrete being subjected to a pre-determined number of vibrations.

A novel feature of this pressure-vibration finisher is a series of equally spaced revolving disks mounted at a 30-degree angle on a shaft which extends across the front of the machine. The reciprocating spiral motion of these disks keeps the head of concrete in front constantly rolling and cuts it off at the proper level for pressure-vibration finishing.

This machine is driven by a centrally located power plant, comprising a gasoline engine or electric drive, worm and gear reduction unit, automotive transmission for forward and reverse movements, and chain and sprocket drives to all wheels. The power plant and driving mechanism are insulated from vibration through the use of special vibration dampeners.

New Diesel Tractor

Another model in the new line of Allis-Chalmers General-Motors-diesel-powered tractors has recently been announced by the Allis-Chalmers Mfg. Co., Tractor Division, Milwaukee, Wis. In addition to the low fuel consumption and smoothness of operation of its full diesel engine, the new HD 7 54-hp model has all the other features of its "big brothers."

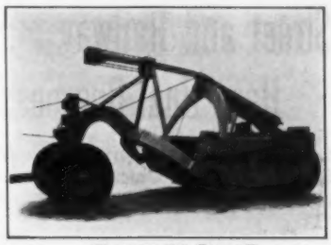
Included in these features are Velvetouch bi-metallic clutches and brakes, Positive Seal truck wheels and idlers requiring lubrication only once each 200 hours of operation, and a new track release spring mechanism which reduces wear on tracks and prevents unnecessary strain on other tractor parts. It is available in 52-inch tread and 63-inch tread models, and has a four-speed transmission giving a choice of forward speeds from 1.84 to 5.82 mph and a reverse speed of 2.19 mph.

The new HD 7 tractor is suitable for use with 5-yard two or four-wheel scrapers, 8 to 10-foot blade graders, sheepsfoot rollers, 7-yard wagons, bulldozers, and similar units.

Sheaves Out of Dirt On Latest Carryall

The latest model of the LeTourneau single-bucket Carryall scraper, rated at 8.2 cubic yards struck capacity and 11 yards heaped, has a number of new features. Loading has been made easier by a longer and steeper blade base, which causes the material to boil in, flow back into the bowl and forward into the apron, according to the manufacturer, R. G. Le Tourneau, Inc., Peoria, Ill., and Stockton, Calif. Additional yardage is possible by higher sides and a built-up apron which retains full loads and prevents spilling. A newly designed A frame gives more room for bigger loads, speeds up loading, facilitates dumping of sticky materials, and also adds structural strength, it is stated.

With the apron cable dead-ended on the apron, all hoist and unloading cables are now placed up and out of the dirt, eliminating abrasive wear on the cable. The power demands of larger loads are said to be reduced by centering fixed sheaves at the tail-gate so that a direct pull is attained on the positive-ejection tail-gate.



The new LS Carryall.

At the option of the purchaser, this Model LS Carryall can be fitted with either four or six large tires which give ample flotation and necessary compaction. Plenty of tire clearance at all times is provided by a goose-neck type yoke.

TARPAULINS
ROAD MATS
WINDBREAKS

CONTRACTORS' SUPPLY DEALERS in every state sell the Fulton line. Specify SHURE-DRY and FULTEX Tents, Tarpaulins, and Windbreaks, anything made of canvas. Also Fulton Road Mats and Burlap. Fulton products are good and their prices are right.

If your dealer can't supply you write our nearest plant for catalog, samples and price list.

write for prices

Fulton Bag & Cotton Mills

LOW COST
3/8 to 1/2 inch Rock

TELSMITH

INTERCONE
CRUSHER

You *expect* costs to be low with a Telsmith Crusher. The Intercone cuts crushing costs to a surprisingly low figure, even for Telsmith.

But it's the *record low price* you pay—and all the extra crusher features you *get* for your money—that make the Intercone something to shout about!

You get every *advanced* feature of crusher design! And the same superior performance and all-around dependability that has made the Telsmith line America's standard for crusher value.

You *make more money* with an Intercone on the job. With its flared head and concave, settings for ⅜ and ½ in. aggregate are easy and economical. Choke feed . . . high speed crushing by *impact* mean a larger tonnage—faster! The product is finer . . . and better!

You *save more money* with an Intercone on the job . . . operating costs are so surprisingly low. And that goes for maintenance, too. Intercone takes less power . . . less oil . . . less manganese steel. And it's positively protected against tramp iron.

Present performance is *the proof*. In plants all over the country, Intercone Crushers are setting new production and profit records for their owners.

Write for *details*—right *now!*

IC-2

Lowest Price for Any Reduction Crusher of Equal Size

AND YOU GET ALL THESE FEATURES

● *big capacity* ● *wide range of fine sizes* ● *quick, easy adjustment* ● *choke feed* ● *strong steel structure* ● *lead bronze eccentric sleeves* ● *high grade alloy steel parts* ● *force-feed lubrication* ● *positive protection against tramp iron* ● *lowest headroom.*

SMITH ENGINEERING WORKS, 4014 N. HOLTON STREET, MILWAUKEE, WISCONSIN

50 Church St. New York City · 211 W. Wacker Drive Chicago, Ill. · 713 Commercial Trust Bldg. Philadelphia, Pa. · 81 Binney St. Cambridge, Mass. · Brandeis M. & S. Co. Louisville, Ky. · Roanoke Trac. & Equi. Co. Roanoke, Va. · United Steel Sales Toronto, Ont.

Street and Railway Have Dual Overpass

Concrete Structure Carries Niagara St., St. Catharines, Ontario, and Electric Line Over Queen Elizabeth Way

✦ ELIMINATING cross traffic at grade at many of the more heavily traveled cross roads is the standard procedure on the 95-mile Queen Elizabeth Way, a dual boulevard highway between Toronto and Fort Erie via Hamilton, St. Catharines and Niagara Falls, Ontario. To do this has required the construction of many overpasses of different types. One of these about 10 miles west of Niagara Falls carries Niagara Street, St. Catharines, and a single-track electric railway for freight only over the Queen Elizabeth Way.

A. Cope & Sons, Ltd., of Hamilton, Ontario, handled the concreting of the retaining walls for the overpass structure with a complete set-up close to the overpass and on the right-of-way of the new highway. All aggregate was hauled a distance of 7 miles from commercial plants, stockpiled on the ground, and then rehandled to the volumetric batching plant by a McMyler Interstate crane with a 50-foot boom and a 1-yard clamshell bucket. The cement for the batches was stored on a crib dock where the paper bags of cement were stacked and protected from rain by heavy tarpaulins. All the concrete was batched into a fleet of heavy-duty Mack trucks and hauled with the cement to the Smith 27-E paver which was run up onto the embankments above the two abutments or retaining walls.

The footings for the walls were carried 6 feet below pavement level into sticky gumbo clay with no piles. The structure was designed by the Canadian National Railway engineering staff as the electric freight line is a subsidiary of that railroad. The contractor used 1 x 7-inch tongue-and-groove lumber with 2 x 6-inch studs and two lines of double 4 x 6-inch rangers for the forms for the lower section of the wall above the footing. These were tied with wire ties through to the rangers and braced inside to the key running longitudinally throughout the length of the base. These 2 x 6-inch braces to both sets of forms were removed as the concrete reached the height of 2 feet or more, or sufficient to support the forms against their own weight as they sloped in toward the center.

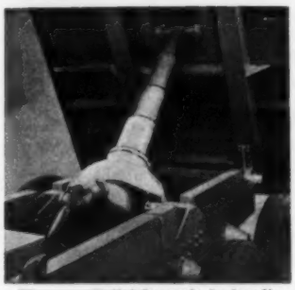
It was necessary for the contractor to remove a 6-foot old concrete box culvert which was broken up with concrete busters operated by a Sullivan portable air compressor.

On this job, which was awarded to A. Cope & Sons, Ltd., of Hamilton, Ontario, L. Cowell was Superintendent, and G. Bullock was Resident Engineer for the Ontario Department of Highways.

Telescopic Hoist Announced by Heil

A new single-cylinder telescopic hydraulic hoist, designed especially for mounting on six-wheel four-wheel-drive trucks or on standard all-wheel-drive trucks with side propeller shaft, has recently been announced by the Heil Co., Milwaukee, Wis. Its use, however, is not restricted to these models. Its low mounting varies between 8 and 15 inches, depending on tire clearance as well as hoist clearance of the truck mechanism.

The hoist proper consists of a main cylinder having a 9-inch bore, supported in an all-steel box girder cross support. This support pivots in broad saddles attached to the chassis frame and the base is fitted with a flange so that the valve



The new Heil telescopic hydraulic hoist.

housing can be bolted onto the base casting. This hoist has either two, three or four telescopic sleeves, depending upon mounting conditions. The hoist crosshead shaft provides flexible attachment to the body sub-frame. To prevent the body from dropping suddenly in case of pressure failure, the hoist is fitted with a check valve on the high-pressure side. The separate Heil precision-built pump can be located anywhere forward of the hoist and is equipped with roller bearings and replaceable wear plates. The holding valve assembly is designed to raise, lower or hold the body at any desired angle.

One of the features of this Heil telescopic hoist is its low weight compared with its lifting capacity. The complete assembly, including all necessary connecting parts, power take-off, etc., weighs only 950 pounds.

Further information on these hoists is contained in Bulletin HB-140, copies of which may be secured direct from the manufacturer by mentioning this item.

Electric Etcher Marks Small Tools Indelibly

A new illustrated folder issued by the Ideal Commutator Dresser Co., 1260 Park Ave., Sycamore, Ill., describes in detail the Ideal electric marker, which etches any desired inscription on glass, steel, iron, bronze, hard rubber, plastics, porcelain, marble, tile and ceramics. The improved model of this marker has a more powerful cutting stroke, simplified stroke adjustment, an improved hand grip, and is equipped with either a special alloy or diamond cutting point. It is particularly adaptable for marking small tools and laboratory equipment in such a manner that theft or accidental removal is reduced to a minimum.

The Ideal Marker is a small electric hammer making 7,200 tiny cutting strokes per minute. It comes complete with 6 feet of cord, a plug and an on-off switch for 110 volts 60-cycle alternating current. It weighs only 19 ounces.

Arc Welding Electrodes

An illustrated booklet "Wilson Arc Welding Electrodes" has recently been issued by the Wilson Welder & Metals Co., Inc., 60 E. 42nd St., New York City, as a useful guide in the selection of proper electrodes for all classifications of welding work.

The booklet reviews the general description, application, procedure for use, and physical properties of Wilson electrodes for numerous and varied welding purposes. The final section of the booklet is devoted to welding symbols and instructions for their use, as published by the American Welding Society. Copies of this booklet No. ADW-18 may be secured direct from the manufacturer.

New Catalogs Feature Excavator Improvements

New illustrated catalogs describing the latest improvements in the line of Byers shovels, draglines, clamshells and back-hoes have recently been issued by the Byers Machine Co., Ravenna, Ohio. Among these features are the fact that the new ⅜-yard Bearcat Jr. is now offered with a high-lift shovel boom and stick; power has been increased on the ¾-yard Model 83; and new motors are available on the ⅜-yard Model 55, the ½-yard Models 60 and 65, and on the ⅝-yard Model 75.

Copies of these new catalogs may be secured by interested contractors and state and county highway engineers direct from the manufacturer.

North Dakota Ratifies Anti-Diversion Amendment

In a two-to-one popular vote, North Dakota has become the eighth state to adopt a constitutional amendment safeguarding the integrity of its automotive tax funds. The measure, initiated by petition and submitted to the people at the June primary, will prevent future appropriation by the legislature of gasoline and motor-vehicle taxes to non-highway purposes. The other states which have ratified similar amendments against road-fund diversion are California, Colorado, Kansas, Michigan, Minnesota, Missouri, and New Hampshire.

At the coming November elections, the voters in Idaho, Nevada and South Dakota will ballot on the adoption of similar amendments designed to guarantee that all automotive tax funds shall be used exclusively for road purposes. In Iowa and Wisconsin, the legislatures have passed resolutions proposing to submit such road fund amendments to the people. Under the constitutions of these two states, a resolution for a constitutional amendment must be adopted by two successive legislatures before it is submitted to popular vote.

JAEGER Builds the MODERN HOIST

● FINGER-TIP CONTROL of Loads up to 100 H.P. thru Giant Expanding Frictions or Clutches.

● ANTI-FRICTION BEARINGS, replacing babbitt or bushings on all heavy duty models.

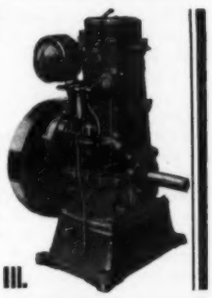
Combined All-Steel Side Frames and Base (50% stronger, hundreds of pounds lighter), Smoother Power, Silent Chain Drive. Sizes 6 to 100 H.P., Gas or Electric, 1 to 3 Drums.

Send for catalog, prices

THE JAEGER MACHINE CO
701 Dublin Ave., Columbus, Ohio

STOVER Announces A NEW LINE of DIESEL ENGINES with Lanova Combustion Chamber

Smoother running. More power per cubic displacement and per pound, with proportionate lower cost. Available in 4 sizes and a variety of mounting bases. 7½ and 10 H.P. models are single cylinder. 15 and 20 H.P. are twin cylinder. Illustration shows conventional stationary type. Twin cylinder models have No. 1 Bell housing with enclosed flywheel. Write Dept. D93G for Bulletin No. 51 with complete information.



STOVER MFG. & ENGINE CO., Freeport, Ill.

DO IT BETTER

DO IT CHEAPER

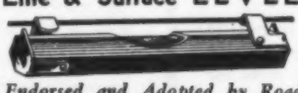
★ If you want plenty of power . . . speed . . . sturdy construction . . . low operating and maintenance cost . . . dependable service and properly engineered features, investigate HUBER. Write for complete descriptive features.

THE HUBER MFG. CO.
MARION, OHIO, U. S. A.

6 SIZES 5 to 12 ton GAS or DIESEL

Buy a **HUBER**

SAND'S-STEVENS Line & Surface LEVEL



Endorsed and Adopted by Road Builders and Contractors

Level is easily and quickly attached to line. Special feature construction prevents accidental detachment from line. Construction is sturdy, and accuracy guaranteed.

SAND'S LEVEL & TOOL CO.
8521 Gratiot Ave. Detroit, Mich.

Roebling Opens Office And Warehouse in Texas

John A. Roebling's Sons Co. of Trenton, N. J., will open a new branch office and warehouse in Houston, Texas, in the near future. Robert A. Hill, formerly Mid-Continent Manager for Regan Forge & Engineering Co., has been appointed Branch Manager of the Southwest Territory, which now includes Texas, Oklahoma, Louisiana, and sections of Mississippi and New Mexico. Mr. Hill will have charge of sales and local stock of Roebling's complete line which includes wire rope, electrical wires and cables, cold rolled flat wire and specialties, and woven wire fabrics.

Mr. Hill is a native of the Southwest and before his association with Regan was Division Manager for Broderick & Bascom Wire Rope Co.

Asphaltic Road Materials Specifications Revised

Copies of the "Revised Specifications for Slow-Curing Liquid Asphaltic Road Materials," adopted by The Asphalt Institute on May 14, 1940, are now available without charge. In these new specifications, the same system of viscosity limits has been incorporated as were developed for the medium-curing and rapid-curing products, as recently promulgated by the Institute in its pamphlet "Revised Specifications for Cut-Back Asphalts."

Requests for either of these pamphlets, known as Construction Series No. 51 (cut-back asphalts) and No. 52 (the new one on slow-curing asphalts) should be sent to The Asphalt Institute, 801 Second Avenue, New York City, or to this magazine.

George Freers Joins Marmon-Herrington Staff

Announcement has been made by the Marmon-Herrington Co., Inc., Indianapolis, Ind., that George H. Freers, widely known in automotive and engineering circles, has joined its engineering staff. This company is increasing its production activities to meet government requirements for all-wheel-drive trucks and other special equipment, as well as the increasing demands for its products for use in the construction and highway maintenance field.

Part of the bituminous distributing equipment of the Truman L. Flatt Co. fleet, Springfield, Ill. Mr. Flatt figures that Standard Red Crown, Iso-Vis Motor Oil and Paul Rickcords, Standard Automotive Engineer, have helped him reduce fleet operating costs 30% in one year.

CONTRACTOR SAVES 30% OF OPERATING COSTS

After one year's experience with Standard Automotive Engineering Service, here's what Truman L. Flatt, road contractor in Springfield, Illinois, has to say:

"I am very well pleased with the savings shown in fuel and lubricating costs, and this, together with the services performed by your Automotive Engineer, has enabled me to reduce my operating cost as much as thirty per cent in the last year."

It certainly seems that Mr. Flatt found this Engineering Service helpful. Why don't you join him and hundreds of other construction equipment operators and find out just how helpful this service can be.

HERE'S HOW THESE ENGINEERS WORK

There's no mystery about the service these engineers render. The methods they use and the equipment they have for checking fleet equipment are familiar to many fleet operators. They do have one advantage. They know automotive fuels and lubricants and how their products should perform under various conditions. When performance isn't up to par they have instruments for finding out why. It's as simple as that—but it works!

MISSOURI COUNTY CUTS GREASE COSTS ONE-THIRD

Gasoline consumption is not the only interest of a Standard Oil Engineer. For instance, the road maintenance equipment shown above is typical of that operated by Knox County, Mo. Grease consumption is an important item in the cost of operation. A Standard Automotive Engineer suggested a test of Standard Gear Lubricant. The test showed that Standard Gear Lubricant gave *all the advantage* of the grease formerly used at *one-third less.*

HERE'S WHERE YOU'LL FIND YOUR STANDARD AUTOMOTIVE ENGINEER

Billings, Montana
Chicago, Illinois
Davenport, Iowa
Decatur, Illinois
Denver, Colorado
Des Moines, Iowa
Detroit, Michigan
Duluth, Minnesota
Evansville, Indiana
Fargo, North Dakota
Grand Rapids, Michigan
Green Bay, Wisconsin
Huron, South Dakota
Indianapolis, Indiana
Joliet, Illinois
Kansas City, Missouri
LaCrosse, Wisconsin
Mankato, Minnesota
Mason City, Iowa
Milwaukee, Wisconsin
Minneapolis, Minn.
Peoria, Illinois
Quincy, Illinois
Saginaw, Michigan
St. Joseph, Missouri
St. Louis, Missouri
South Bend, Indiana
Wichita, Kansas

Why not have one of these engineers explain fully just what he does to help make these savings. A card to your local Standard Oil (Indiana) office or to 910 S. Michigan Avenue, Chicago, Illinois, will reach the engineer you want. In Nebraska, call or write Standard Oil Company of Nebraska at Omaha. Just say, "We'd like to have your Standard Automotive Engineer call."

STANDARD OIL COMPANY (INDIANA)

LUBRICATION ENGINEERING THE RIGHT LUBRICANT • PROPERLY APPLIED TO REDUCE COSTS

C. & E. M. Photo

Side-hill batching plants, this one for cement, simplified handling of materials for the concrete.

Two 27-E Pavers Used On Indiana Highway

(*Continued from page 7*)

clamshell bucket loaded the bin of the plant.

Another run of about equal distance took the batch truck to the third batching plant where it received its weighed amounts of gravel and sand. These materials were also received in hopper-bottom freight cars, emptied into separate track hoppers and run into pits from which they were loaded into the two sections of the Blaw-Knox batching plant by an American crane with a 40-foot boom and a 1-yard Owen clamshell bucket. The trucks had to back under this bin as the space behind the plant was used by the crane which had to serve two pits. Also the trucks had to turn at this end and there was no space for a loop similar to that at the entrance end. All in all this is one of the best batching layouts we have seen in many a year, making use of the natural advantages of the delivery point.

The contractor used four of his own trucks for batching and hired a maximum of sixteen local trucks, the number depending on the length of the haul. As noted in the introductory paragraph, a 1,500-gallon tank truck with a wide sprinkler arm at the back was used to water the hauling road so that the volumes of dust would not create a hazard and cause accidents in the fast-moving truck fleet. This same watering unit was used to water the straw during the curing of the concrete.

Preparing Grade and Forms

As the ground through which the contract ran was somewhat clayey and therefore tough, the contractor ran a heavy scarifier through the ground ahead of the fine grading so that the machine could easily trim the grade to the proper section. Also a single-tooth ripper was used to loosen the material along the form line ahead of the Cleveland Formgrader which cut the two trench lines to a smooth line. The trenches were cleaned with a crew of four men followed closely by the three form setters which placed 9-inch Heltzel forms on one side and 9-inch Metaforms on the other side. A Blaw-Knox-Flynn Surgrader then ran on the forms and cut the thickened-edge section of the subgrade uniformly on both sides.

Immediately behind the Surgrader the contractor kept a scratch template which was run ahead constantly by the Finegrader operator to check his work. The grade was then rolled by a 7-ton Huber gas roller to consolidate any loose material ahead of the final acceptance checking of the subgrade with a second scratch template run under the eye of the state inspector. Four men were around this template shoveling away the earth that fell against the forms when the Finegrader cut the thickened edge and also using the checking device for the shape of the thickened-edge section to insure adequate depth of concrete. This device consisted of a 3-inch timber cut to the 9-inch depth at the form and 7 inches deep 24 inches from the form and with a ¼-inch steel plate on top for rigidity and for attaching the pipe handle by which it was moved quickly along the forms for checking. This checking device was used ahead of the final scratch template.

Four men and a truck were used by the contractor to carry the forms ahead and spot them for the form-setting crew as they were pulled from the previous day's pour. The method of pulling was to use a tractor and bulldozer with a chain that was attached to the end of the form and the bulldozer raised, lifting the form away from the concrete and pulling the pins at the same time. Behind the pouring one man on each side shoveled the concrete and earth from the base of the forms so that they would be clear for easy pulling the following day. The base of the forms was covered with shoulder dirt by the three men that lined up the forms behind the Surgrader so that the concrete spilled by the bull float or in pouring would not adhere to the forms and make cleaning a long job, delaying their use.

Two Pavers Pour the Concrete

Indiana requires striking off of the concrete 2 inches below the top of the forms for placing the wire-fabric reinforcing mats. This is done in several states but usually the contractor runs the strike-off directly attached to the paver at a fixed distance or pulled by a winch on the paver. On this job the contractor "chose to run" two pavers, the first a MultiFoote 27-E with its boom swung back as in most paving for pouring the lower section of the concrete. It was immediately struck off by a heavy steel unit running on four wheels, each equipped with eccentric axles permitting raising the strike-off over the expansion and contraction joint assemblies. It was pulled by a Caterpillar Thirty running backward down the grade so that the man could watch the operation without developing a strained neck. A 70-foot steel cable used for pulling was attached to the two ends of the strike-off.

After the placing of the tie bars across the center joint and the laying of the fabric, the second paver with the same batches of concrete and also mixing the batches 60 seconds and for a 2¼ to 2¾-inch slump, spread its batches. The second paver, a Rex 27-E, ran with its boom forward to minimize the space between pouring the bottom and top concrete and also to give a better spacing for the maneuvering of the batch trucks.

There were two puddlers at the strike-off who rode it for extra weight when it was pulled ahead, and then two men spaded the sides of the concrete against the forms both for the bottom pour and again for the top. There were three puddlers working ahead of the finishing machine.

Slab Finished Both Ways by Machine

The transverse finishing of the slab was done by a Lakewood double-screed finishing machine. This was followed closely by a self-powered Cleft Plane machine with two men, one of whom watched the feeding of the ⅛ x 2¼-inch center ribbon and floated over it and, with the helper, used the cutter bar at the back and set the two transverse strips of premoulded material ¼ x 2 inches and floated over these.

The setting jigs for the expansion joints were removed immediately behind the Cleft Plane machine by the men walking in on the concrete and carrying the jig out. The foot marks were well removed at once by the Koehring longitudinal finisher with its 10-foot steel float working from a template set to the true crown of the concrete surface. Considerable water and grout was worked out of the concrete by this machine and pushed over the edge of the forms. Any further excess water and grout was dragged off by the two finishers, using 10-foot Cleveland metal straight-edges. The two hand finishers edged the sides of the slab and then went back and used the fiber brooms for the final non-skid surface. One joint finisher pulled the caps from the expansion joints and edged them. The contraction joints were also edged.

Pavement Cured With Straw

A rolling bridge was used for the two men who placed the strips of wet burlap over the broomed surface of the concrete for the initial curing period. This was sprinkled at once and over night as required to prevent its drying. It was removed the next morning by the curing crew who placed sufficient straw on the pavement to give 3 inches cover when the straw was wet. The sprinkling of the straw was done by the tank truck. This curing period was continued for 10 days and then the pavement was ready for traffic. The straw was forked off, loaded onto trucks and hauled forward for re-use. The sight of one of these trucks coming down the shoulder made one think the contractor had gone into farming.

(*Concluded on next page*)

USE RIGHT BUCKET FOR THE JOB

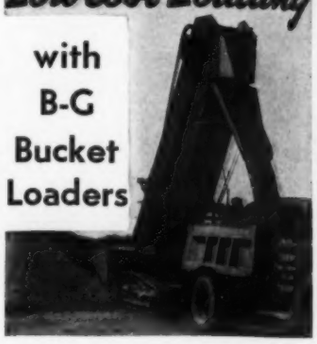
Hayward makes all four—clamshell, dragline, electric motor, orange peel. A Hayward recommendation is unprejudiced.

—HAYCO—

THE HAYWARD CO., 32-36 Dey St., New York

Hayward Buckets

Low Cost Loading with B-G Bucket Loaders



● Barber-Greene Bucket Loaders are designed primarily for the job of loading trucks faster and at less cost than any other method. No other method can load bulk materials from ground to trucks at less cost. For over twenty years, Barber-Greene has pioneered in Bucket Loader design, building into the Loader greater capacity and ease of operation at less operating costs.

There are three B-G standard Loader models to choose from, with screens and accessories available for each. One of these can best meet your requirements. S-24

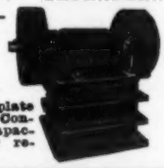
BARBER-GREENE
AURORA ILLINOIS

you can depend on

GRUENDLER EQUIPMENT

DEPENDABLE—Long Life, Low Power Costs and Upkeep. Complete Safety

Bronze or Roller Bearing
JAW CRUSHERS
Heavy Armor plate steel or cast steel Constructed. Large capacity. Small power requirements.



Stationary or Portable
HAMMER CRUSHERS
Ideal for farm to market road work. Crushes stone to 1" minus or to fine agricultural dust.

For All Type Roads Whether Mountain or Farm to Market or State Highway

Portable Unit with Bucket Elevator

"Since 1885"

GRUENDLER
CRUSHER - PULVERIZER - CONVEYORS

FREE 16-page Illustrated Catalog
GRUENDLER CRUSHER & PULVERIZER CO.
2917-27 N. Market St., St. Louis, Mo.

ANC
WEED-KILLERS
•
SIMPLIFIED CHEMICAL CONTROL
•
CHLOR-ARSENITE:
META-CHLORATE:
TURF CHLORATE:
"SILVER-SAND"
PYRO-ARSENIC ACID
SODIUM-ARSENITE,
SODIUM-ARSENATE

"Selective" or— "Kills-All"

A WEED-KILLER FOR EVERY PURPOSE

Chemical weed-killing has many uses and modern practice demands specified control.

We have formulated specialized products. Total eradication can be attained with a chemical to suit the specific need—or, with other chemicals, grasses can be preserved while weeds and brush are killed.

Write for technical bulletins and engineering data on application methods.

R. N. CHIPMAN COMPANY, Inc.
New York Sales Office
21 East 40th Street
NEW YORK CITY

C. & E. M. Photo
A device developed to check the subgrade for the thickened edge of the concrete slab.

Relocating U. S. 30 At Valparaiso, Ind.

(Continued from preceding page)

Joints and Steel

With all other states going in for heavier and heavier expansion joint reinforcing, Indiana has done quite the reverse with 7½-inch dowels instead of the usual 18 to 24-inch dowels. The expansion joint consists of ¾-inch premoulded material cut to the exact section of the pavement but ½ inch low and set flush with the subgrade. The dowels for transferring the load from one slab to the next are ¾-inch round dowels 7½ inches long with tight-fitting bearing sleeves and capped on both ends. They are spaced 19 inches apart across the 22-foot slab and rest on double metal chairs. The setting jig used for the expansion joints had a steel setting plate to hold the material straight and rigid during pouring. It also had a cap which was left in when the jig was removed but which was removed by the joint finisher. The jig was held in place during pouring by three heavy spikes made of sheet steel. The joints, both expansion and contraction, were set by three men aided by one man who helped carry the jigs ahead. The concrete over the expansion joints was vibrated by a White vibrator mounted on a sled composed of two 3½-foot lengths of 2 x 8-inch planks spaced 10 inches apart and pulled over the top of the joint once.

The contraction joints used the same size, number and spacing of dowels as the expansion joints but with no premoulded material set with the steel.

The tie bars across the center joint were placed immediately after the lower concrete was struck off. They were ⅝-inch round deformed bars 4 feet long and placed at intervals of 5 feet. Over these the reinforcing fabric was placed by the joint men and helper. The fabric mats were composed of four No. 3 gage (approximately ¼-inch) wires at the outside of each mat which extends one-half way across the slab, the balance of the wires being No. 6 gage (approximately 3/16-inch). The spacing of the longitudinal wires is 6 inches and the transverse wires 12 inches. The mats are 14 feet long x 10 feet 6 inches wide and placed 3 inches from the forms, leaving a 6-inch space at the center. They were lapped 14 inches at the ends.

The expansion joints are spaced 120 feet apart in Indiana with two intermediate contraction joints at 40-foot intervals.

Miscellaneous Items of Interest

In order to keep the shoulder in shape for the pavers to run along without tipping and to have them in shape also for the batch trucks, the contractor used an RD5 tractor with a LaPlant-Choate bulldozer to smooth the way. This same machine was used to pull the scarifier and ripper for loosening the grade as mentioned.

When the grading was in full swing on this job, considerable trouble was experienced with springs in some of the cuts. Notable was one where after the slope had been cut back to 2 to 1 it slid in, letting fully 600 cubic yards of material slip onto the roadway section. There was a considerable flow of water in this shallow sidehill cut which was removed by installing 150 feet of 12-inch bituminous-coated perforated Armco pipe and 600 feet of similar 6-inch pipe. The flow from the culvert pipe connected with this drainage system was about 3 inches of water in a 15-inch pipe continuously and half full in 6-inch pipe.

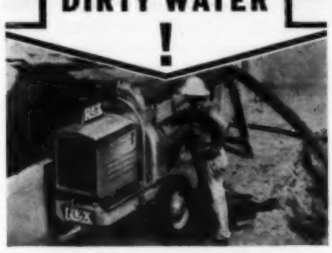
The water supply for the job was secured from various creeks and springs along the right-of-way, using one Rex and one Novo triplex pumps delivering to the 2½-inch pipe laid along the shoulder. The paver valves were spaced about 300 feet apart and the pavers carried 200 feet of hose each. When it came time to move the paver hose the ½-ton pick-up truck was commandeered and the valve end of the hose attached to the bumper and the truck backed down to the next valve, and dropped the hose.

The contractor worked only one shift from 8 a.m. to 4:30 p.m. with one-half hour out for lunch. The men's lunches were supplemented greatly in variety and tastiness by a man who showed up regularly at noon with a small truck loaded with milk, soft drinks, small pies, candy and ice cream. Needless to say he did a land-office business. Another business enterprise that sprang up on the job was run by a pair of small boys who came out with two thermos jars of lemonade and sold it throughout the day to the men. On hot days the business was particularly good and the supply was temporarily exhausted. This led to competition one day when a boy, somewhat larger and living nearer, came out with a jar of lemonade. Not brooking competition, it was stopped quickly by the two getting the larger boy down in a pile of curing straw and giving him a thorough going over. He did not appear the following day.

Personnel

The contract for FAP 17 N-3 was awarded to Bontrager Construction Co. of Elkhart, Ind., on its low bid of $247,114.59. Carl Moore was Superintendent for the contractor and C. H. Sweeney was Project Engineer for the State Highway Commission.

PAY LESS
FOR PUMPING DIRTY WATER !



SEND FOR NEW, FREE BOOK!

With its famous Rex Z-Metal impeller and peeler, your Rex Speed Prime pump is better fitted to stand the gaff in pumping abrasive, dirty water! The big Rex cleanout cover, the Rex big tank and other Rex features that make the Speed Prime pump the best buy are explained in the new book, "Pump for Pump, the Best Buy in '40." Send for your copy! Chain Belt Company, Dept. P-8, 1666 W. Bruce Street, Milwaukee, Wis.

REX PUMPS

Six-Cylinder Diesel Converts Ford Trucks

Announcement has been made by The Buda Co., Harvey, Ill., of the development of a 6-cylinder diesel engine for installation in either conventional or cab-over-engine Ford trucks. While this company has been making a 4-cylinder diesel for use in conventional models of Ford trucks for the past two years, this is the first time that a 6-cylinder unit has been available.

This package unit has been so engineered that it can be installed readily and easily. The manufacturer states that on one of the many installations of these 6-cylinder diesels in conventional 1940 Ford trucks, a demonstration trip of 165 miles, with a fuel load, required 15 gallons of fuel. This is an average of 11 miles per gallon of fuel, as compared with 5 miles per gallon of gasoline.

Literature containing further information on these Buda-Lanova 6-cylinder diesel engines for installation in 1940 Ford trucks may be secured direct from the manufacturer.

Bituminous Conference Postponed Until 1941

Because the Montana Highway Department has under way this season one of the largest and most extensive construction programs which it has had for a number of years, it has been decided to postpone the Sixth Annual Montana National Bituminous Conference until the autumn of 1941.

The arranging and handling of this Conference requires such an amount of time and work that the State Highway Department engineering staff can not do justice to it along with the construction activities in connection with approximately a hundred highway projects.

Improved
EXPANSION JOINTS
by SERVICISED

Assure Longer Lived, Trouble-free Highways

THE SELF-CONDITIONING JOINT

. . . has ¼-inch waterproofed fibre sides and a ¼-inch high melt point asphalt or rubberized asphalt core. It's engineered by Servicised and laboratory tested to prove it performs the functions of an expansion joint *better*.

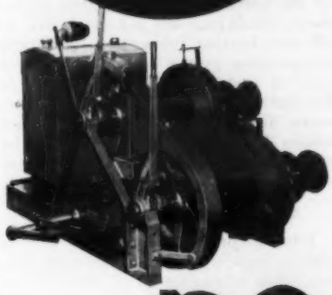
- Extrusion Controlled
- Waterproofness Increased
- Breakage in Handling Practically Eliminated

BUY SERVICISED! . . .

There's your formula for obtaining dependable, reasonable *cost* expansion joints. Since 1914, Servicised has been developing and producing expansion joints. To do the job *better* has been the constant aim of Servicised engineers. Next time you need joint of any material—to meet *any* specifications—buy Servicised. You can *rely* on the product.

SERVICISED PRODUCTS CORP.
6051 West 65th St., Chicago

MORE HOIST FOR LESS MONEY



THE MODEL 20
AMERICAN
General Purpose Hoist

has many features found in no other hoist in its price class — Stand-out superiorities which lift it high above all competitive hoists of corresponding capacity:

For instance:

1. Frictions and brakes are at opposite ends of the drum for cool running.
2. Shrouded ratchet ring with chisel type dog.
3. Drive shaft turns in anti-friction bearings and is placed between the drums — both drums revolve in the same direction.
4. Improved band type frictions: easy to engage: economical.

In a word — MORE HOIST for LESS MONEY. Write for Bulletin No. 100-H-0.

AMERICAN HOIST & DERRICK CO.
NEW YORK SAINT PAUL, MINN. CHICAGO
AMERICAN TERRY DERRICK CO.

for safe WIRE ROPE FASTENINGS
genuine CROSBY CLIP

CONTRACTORS AND ENGINEERS MONTHLY
470 Fourth Avenue, New York

Enclosed is my remittance of $2 for the next twelve issues of CONTRACTORS AND ENGINEERS MONTHLY.

Name_____

Position_____
(Or Type of Business)

Address_____

(City)_____

N.B., A two dollar bill, check or postage stamps will be entirely acceptable.

Choose Your Lubricants By Grades and Types

(*Continued from page 25*)

lubricant will adequately resist this washing action. The base of this lubricant should be a selected highly adhesive steam refined cylinder stock.

Bearings

Due to the exposed nature of so many of the bearings on construction equipment, conditions are not conducive to effective bearing lubrication. Although compression grease cups, the pressure gun, or just an oil can are used for lubricating engine bearings, dust, dirt, water and abrasive matter penetrating within bearing clearance can best be counteracted by the compression grease cup or the pressure gun.

Gasoline and Diesel Engines

Internal-combustion-engine lubrication is more centralized; normally but one grade of engine oil is required, as in the automotive engine, for cylinders and bearings. Therefore, with engines of this type, only one grade of oil need be stocked. The routine in lubrication is comparatively simple. It merely requires:

1. Checking the oil level periodically, and adding make-up when necessary.
2. Draining the crankcase and flushing, as recommended by the engine manufacturers.
3. Selecting an oil of physical characteristics best suited to the operating conditions.

The carbon residue content, viscosity, and pour test are of most concern. Oils showing low carbon residue are best suited to either the diesel or gasoline engine, for this insures against accumulation of objectionable residual matter around piston rings, on cylinder heads, or around valves, any or all of which might readily reduce power output and the efficiency of the engine.

Viscosity and pour test, in turn, are important in cold weather service, for they are indicative of fluidity. Low-pour-test oils within the S.A.E. 10 to 30 viscosity range should meet normal cold weather conditions to permit easy starting and should show adequate pumpability.

In warm weather operation, heavier-bodied oils must, of course, be used, as higher temperatures tend to thin down any petroleum lubricant. Here an oil of S.A.E. 40-50 to 60 range, dependent on the size and speed of the engine, its operating temperature and method of cooling, should be suitable.

The field service internal combustion engine is normally provided for full-pressure or a combination of splash and force-feed lubrication. The oil is circulated by a gear pump, driven by the main shaft of the engine. In some cases, a mechanical force-feed lubricator is also used, especially on the diesel. This device delivers fresh oil to the cylinders and main bearings, drop by drop, overcoming the possibility of dilution by fresh oil of the right viscosity being fed constantly to each element. The oil flow is accurately controlled in volume as well as in its starting and stopping, as the lubricator pumps are driven by the engine.

Motor oils for construction equipment must:

1. Possess as high a degree of lubricating ability as possible.
2. Be resistant to heat.
3. Have dependable seal-forming properties.
4. Have a low pour test to insure ready flow on cold starting.
5. Have sufficient viscosity to assure adequate lubrication at all times.

Lubricating ability is the extent to which an oil develops and maintains a lubricating film between moving parts. The higher this property, the greater is the insurance against burnt-out bearings, scored cylinders, or the development of wear.

Heat-resisting ability is the resistance to decomposition, and the possible development of objectionable carbonaceous residue.

Seal-formation is the extent to which an oil prevents loss of compression, blow-by of combustible gases, or pumping of lubricating oil past the piston rings.

The pour test indicates how the oil will react in cold weather. The lower the pour test or the temperature of relative congealment, the more dependable the lubricating oil. There must be sufficient fluidity to assure of circulation through the lubricating system and instant protection at all times.

Viscosity is the extent to which an oil will resist being squeezed out from between any of the wearing parts under the prevailing pressures. It should maintain a lubricating film of suitable thickness between the wearing surfaces under the prevailing temperatures of operation, yet the oil should never be so heavy or viscous at these temperatures as to cause abnormal internal friction and excessive bearing temperatures.

Viscosity or relative fluidity also involves adhesiveness. A diesel oil should always be sufficiently adhesive to resist being squeezed out from between the wearing surfaces when subjected to normal service pressures. Likewise, it should not congeal or flow with difficulty at any of the lower temperatures to which it might be subjected during storage or operation. This enables even spreading over the surfaces of the cylinder walls, and the maintenance of a piston ring seal.

Internal-combustion-engine lubricants are carefully fractioned in the course of refinement to assure the removal of lighter components, so that the resultant oil will not be so volatile as to require an undue quantity to maintain a suitable lubrication film, especially on the cylinder walls. Careful refining also assures a low emulsification tendency when the oil comes in contact with water.

Refinery procedure and the use of selected crudes also assure that the carbon-forming tendency will be as low as possible. This is most important, as any breakdown which may occur when the oil is exposed to the intensive heat of combustion may otherwise develop a large amount of objectionable carbonaceous residuum. Ultimately this results in cylinder and piston wear which, in turn, may result in loss of compression and reduced power. The grade of the fuel and the completeness of combustion are also controlling factors.

(Part II of this article, continuing the discussion of types of lubricants for other equipment used on construction jobs, will appear in our next issue.)

Contractors: if you are interested in competing for the 1940 Roadside Development Awards, cooperate with the state highway engineers by furnishing them with all necessary photos and data on your work.

New Power Spreader For Sand and Stone

Designed by a Vermont road commissioner for all-year-round highway service, the Superior material spreader, made by the Superior Material Spreader Co., 50 Canal St., Brattleboro, Vt., is now available as a power unit. Three spreading adjustments are provided through the throttle control of the air-cooled engine, the adjustable gates, and the speed of the engine. This allows the materials to be applied and spread from 10 to 20 feet in width and to any thickness desired.

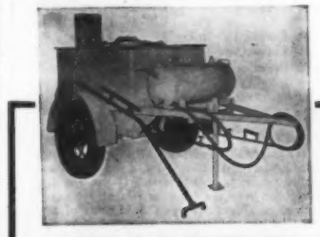
The friction drive of the pneumatic-tired wheel to the disk track eliminates all gears, chains, belts and drive sprockets and allows a close coupling of the unit so that it can be used on the lowest hung bodies. The manufacturer states that this spreader can be attached to any truck, regardless of size or body width, with or without a hole in the tailgate, in less than two minutes. It will handle sand, calcium chloride, chips or pea stone, and works equally well when the truck is backing up as when it is moving forward.

Literature describing the Superior power spreader may be secured by contractors and state and county highway engineers direct from the manufacturer by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Finegrader Improved

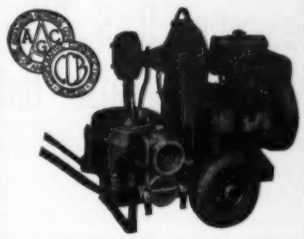
Announcement has been made by the Buckeye Traction Ditcher Co., Findlay, Ohio, of an engineering improvement in its R. B. Power Finegrader. This consists of a lengthening of the wheelbase, so that it is longer than a standard road-form section, and a relocation of the form wheels so that the weight of the Finegrader will at all times be supported by two form sections on each side of the grade, or four in all.

This design change prevents the total weight of the machine from bearing at any time on only one form section on each side of the grade, to eliminate the possibility of the load forcing the forms out of vertical alignment at the joints.



ASPHALT KETTLES
Fire Proof—Oil Burning
Hand and Motor driven spray.
Many sizes. Write for catalog.
White Mfg. Co.
ELKHART INDIANA

NOVO
DIAPHRAGM PUMPS



Novo Diaphragm Pumps will not fail you in the pinches where dirty, mucky, or sand-laden water is to be handled. They are the lift-and-force type that have been designed for greatest pump efficiency and easy portability without the excess weight you used to think necessary in diaphragm pumps. Gears and bearings flooded with oil. Cleanout plate on discharge. Send for information.

216 Porter St.
NOVO ENGINE COMPANY
LANSING, MICHIGAN

PREPAREDNESS is Advisable on Construction Jobs, Too

with DAVENPORT SHEEPSFOOT ROLLER

Where REAL compacting is an essential to permanent construction work, it pays to use modern Davenports. They are positive, flexible and economical. Available in 1, 2, 3, 4 Sections. Drop Forged Feet with RENEWABLE caps. Swivel hitch, rear hitch and cleaners are standard. Varying number of feet to meet any state specifications.

Descriptions and Prices on Request

DAVENPORT LOCOMOTIVE WORKS, Davenport, Iowa
A Division of Davenport Boiler Corporation

"FAR AHEAD OF BUCKETS WE HAVE USED IN THE PAST"

● M. F. Quill & Son, Cincinnati, Ohio, are using a Williams ¾ Yard Multiple Rope Bucket for excavating and material handling. They write: "We are extremely well satisfied with the performance of this bucket and much impressed with your new welded construction. We feel the design, construction and materials are far ahead of any of the competitive buckets we have used in the past."

You, too, will find Williams digging speed and durability a big factor in producing profits. Tell us the type of service you are interested in and we will send free, individual bulletins giving complete information.

THE WELLMAN ENGINEERING CO.
7012 Central Ave.
Cleveland, Ohio

WILLIAMS Buckets
built by WELLMAN

Preparing Aggregate For Shasta Concrete

(Continued from page 17)

ing. A thousand bales of cotton and almost a million pounds of rubber went into the belting. The belt will travel at the rate of 550 feet a minute, and will be able to carry 1,100 tons of material an hour. The various sizes of sand and gravel will be transported one type at a time.

The Processing Plant

Back and forth over the gravel deposit travels Columbia's giant Monighan dragline with an 8-yard bucket, picking up 11 tons of material at each throw. This, aided by a smaller Monighan, with a 5-yard bucket used in stripping work, delivers to a pendulum belt conveyor fitted with skid-mounted hopper. This delivers direct to a stockpile having a capacity of 8,200 cubic yards, live storage. A jaw crusher reduces all conversion rock to maximum 6 inches in raw storage.

In the main mill building, there are four Tyler screens fed from raw stock by a 42-inch belt. Here the gravel is washed and graded, everything greater than 3/16 inch being scalped off to a Joshua Hendy scrubbing trommel. Coarse gravel from the trommel goes by a 36-inch belt to the Tyler classifying screens. The grading here is 3 to 6, 1½ to 3, ¾ to 1½, and 3/16 to ¾, distributed to separate stockpiles of 2,000 tons live capacity each.

If there is a deficiency in any size, larger sizes can be returned to two Symons cone crushers to make a minus ⅜-inch crushed rock, which can be ground up in the Mine & Smelter Supply Co. rod mill. This is in addition to some of the 3/16-inch to ⅜-inch gravel leaving the trommel that can be screened out and sent to a balanced stockpile, from which it may be delivered to the rod mill and processed into sand. Acceptable sand is also processed from the 3/16-inch residue from the screens. In this case, to remove the deleterious scale and fines, it is passed through an Allis-Chalmers differential slug mill. The product of this mill flows to a 20-foot hydro separator.

After the deleterious matter has been eliminated, the underflow containing it goes to a Dorr rake classifier, where coarse sand is removed. Overflow goes to two Dorr rake classifiers for removal of intermediate and fine sand. Overflow from the last of these classifiers, being silt, is wasted.

A similar process takes place with the manufactured sand, which is passed through a smaller Dorr hydro separator and then to the same three rake classifiers. Separate storage piles of a live capacity of 2,250 tons each accommodate the three sizes of processed sand. Weight-controlled feeders take the sand reclaimed from these piles and deliver it, combined in the right proportions, to a 30-inch belt, which in turn delivers to a 30,000-ton live storage pile for blended sand stock. Before passing to the big belt line, both sand and gravel pass over Merrick automatic scales. All motors, controllers and transformers in the plant are General Electric units.

River Goes on Rampage

It seems as though the Sacramento River tried to kick up its heels for one last fling this year, before the bridle was put on for good. One of the principal objectives of Shasta Dam is to put the river in its place and stop the disastrous overflows in the lower country. This year, before anything could be done about it, the river went on an almost record rampage. It tore out a short section from one end of the steel bridge that had been built to carry the main belt conveyor across the river. Spreading out over the flat, it reached the Monighan. No serious damage was done to the machine and it is again doing its eight yards per load.

However, the damage was not such as to hold matters up to any great extent. Concrete placement was not expected to begin until after high water this summer anyway. Also, up at the dam, some fissures had been encountered, requiring some additional time to drill and grout and making the exact date of starting concreting indefinite. As of April 1, who would be first, the dam builders clamoring for gravel or the gravel men calling to "take it away," might have been put down as another of those moot questions.

"Gold in Them Thar Hills"?

When the floods have passed and the big belt is carrying its load 24 hours of the day, the Columbia Construction Co., Inc., will have something else to think about. This deposit of sand and gravel is in an area which has seen much gold dredging for years. Uncle Sam acquired the gravel rights only, not being interested in the fine particles of gold known to exist there, as he has a much larger deposit in Kentucky. So the contractor has put in his own gold recovery equipment in connection with the processing plant.

Fuel Cost Decreased, Capacity Increased

According to J. A. Wolfe of Pittman Bros. Contracting Co., New Orleans, La., an increase of 66 2/3 per cent in capacity and a decrease of 66 2/3 per cent in fuel consumption followed the installation of a General Motors 4-cylinder 71 Series 2-cycle diesel engine in a ¾-yard Koehring dragline operated recently by this company on a job at Gulfport, Miss. This Packaged Power unit has been in operation for six months on heavy-duty work carried on by this firm, which specializes in heavy concrete and bridge construction.

The diesel has never used more than 15 gallons of fuel oil in an 8-hour day, according to Mr. Wolfe, who says that the normal daily consumption of the 65-hp gasoline engine it replaced was about 45 gallons. In addition, he states that the dragline now handles 1¼ yards. The saving in fuel can be appreciated when it is learned that Pittman Brothers paid 18 cents a gallon for gasoline, while the best diesel fuel in that section may be obtained for 7 cents.

Motion Picture Shows Making of Wire Rope

The Bethlehem Steel Co., which added the manufacture of wire rope to its activities 3 years ago with the acquisition of the Williamsport Wire Rope Co., now known as the Williamsport Division, has recently completed an industrial motion picture on the manufacture and use of this product. This film was made just after the completion of a number of changes and improvements at the Williamsport plant, increasing its capacity and efficiency. A new cleaning unit used in preparation of rod for drawing into wire was recently put into service, a number of additions of equipment and changes have been made in the strand and rope-making departments, and several new rope-making machines have been installed which with other additions have increased the capacity of the plant for larger sizes of rope.

The film, "Sinews of Steel," shows the principal operations in steel making, beginning with the handling of iron ore, and places particular emphasis on the fact that steel is made especially to meet the requirements of wire rope. The rolling of rod from the billet on high-speed continuous mills and the processing of rod into wire for making wire rope are covered in detail. Close-ups and section views of wire-drawing operations show the drawing of wire to the smallest sizes. The principle of wire-rope making is shown in the sequences taken in the rope mill, where the course of the wire is followed as it is formed into strand and the strand into rope. Illustrations of many of the uses of wire rope are also included.

A scene from the motion picture "Sinews of Steel" showing one of the new wire-rope making machines recently installed at Bethlehem's Williamsport plant.

"Sinews of Steel" is a sound film, 16 mm in size and four reels in length. It is available for presentation at meetings of dealers, technical societies, trade associations, contractor organization meetings and similar groups. Further information may be secured direct from this magazine.

Minute "HOW" Stories

'DOZER "DYNAMITE" clears trees faster, easier... and cheaper

Clean up on extra profits on your next clearing job. Try the method used by Atlas Construction Company. They wiped a path 700 feet wide and six miles long through the thickly wooded Pearl River basin, near Bogalusa, Louisiana, in record time.

10 Acres Cleared Every 12 Hours

There, five LeTourneau Bulldozers averaged 10 acres of trees, stumps and debris cleared and stacked every 12 working hours. Four of these 'Dozers were mounted on "Caterpillar" D8 tractors, the other on a D6 . . . Just five men—the tractor-'Dozer operators—handled the entire job!

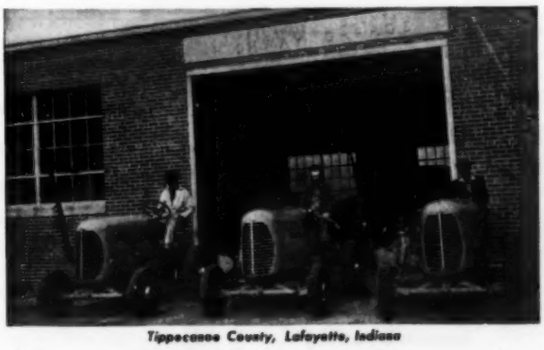
Contrast this with the danger and expense of blasting . . . with slow, back-breaking hand clearing methods. Here is fast-acting cable control that packs the battering force of dynamite into the extremely low 'Dozer bite and high, stump-ripping lift. And here is stamina of arc-welded steel construction throughout 'Dozer blade, bowl and "A" frame, to deliver every powerful blow the largest tractor can give.

Here's Where You Save . . .

What LeTourneau 'Dozers are doing for Atlas Construction, and scores of other successful contractors, they will do for you. Ask your LeTourneau—"Caterpillar" dealer for a demonstration . . . right on your own job . . . TODAY! There's no obligation.

LETOURNEAU

Peoria, Illinois Stockton, California



Tippecanoe County, Lafayette, Indiana

This is the Age of Specialists

You can say what you please, but the fellow who spends all his time doing one thing does it a little better than the guy who plays tackle one day, fullback the next, and winds up at end.

Here in Minneapolis we spend all our time on mowing machinery. We've been at it for over 20 years, and we've learned a few things about it.

If you want the dope on any kind of a mowing machine, write us.

TORO MANUFACTURING CORPORATION
MINNEAPOLIS MINNESOTA

Mowing Machinery Specialists for Over 20 Years

Be you with a really superior dumping unit for handling 2-cu. yd. Detachable Buckets?
SEE OUR MODEL LF
(Load Forward)
DEMPSTER DUMPSTER
For any 1½-ton truck
NO COUNTERWEIGHT OVERHANG SIDESWAY
All the load on the chassis.
DEMPSTER BROS. INC. Knoxville, Tenn.

Street cleaning is a function of urban Union County in New Jersey.

Plenty of Equipment Speeds County Work

(*Continued from page 1*)

Two heatings and two flushings always remove all of the accumulation of carbon in the burner and leave the unit "clean as a whistle."

The separate garage, which stores eight trucks, contains also the paint shop and a storage area for larger parts as well as the tire storage room.

At the parts storage in the separate garage, a very careful stock-accounting system is maintained and no material is issued except on a signed ticket showing who ordered the material, for what job and who received the material to take it to the job. Another set of tickets shows all material turned in because it was damaged, or merely returned to the store. This ticket shows the date, by whom the material was returned, the type of material and who received it at the store. These two sets of tickets place all responsibility on those handling materials and permit a quick check-up.

Equipment

Since Union County is almost completely built up there can be no delay either in repairing the roads or in clearing them of snow in winter. This means that the county has to be very well equipped with both construction and maintenance equipment as well as snow-removal and ice-control units. The first machine we saw operating on a county road was one of the two Austin-Western pick-up sweepers. This seemed rather unusual but so many of the county roads are completely paved from gutter to gutter and run through the heart of cities that the county maintains street-cleaning equipment so that its roads may be the equal of the parallel city streets.

In visiting the shop we were particularly impressed with the "covered wagon" snow-removal units. There are two of these, each consisting of a 10-ton Linn tractor equipped with a Good Roads speed plow and wings which can be raised to slice off the top of a drift, or to move back plowed snow at the sides of the road. Each of these crawler traction trucks has a complete canvas cover, built in the shop, to protect the men who are operating the hand controls for the V-plow and wings inside the machine.

Other heavy and light equipment owned and operated by Union County include: sixteen Mack dump trucks, of which nine are 5-ton, two are 2½-ton and five are 3-ton trucks; three 5-ton Walter dump trucks; four Day-Elder 5-ton dump trucks, and one Day-Elder bus-body truck for hauling men; four Chevrolet 1½-ton dump trucks and one Chevrolet bus-body truck for hauling men; one Fordson tractor with an International mower; two Buffalo-Springfield 10-ton gas rollers, one Buffalo-Springfield 6-ton gas roller and one Buffalo-Springfield 10-ton steam roller; four Ransome concrete mixers of 1, 2, 3 and 6-bag capacities; one Sullivan compressor mounted on a Chevrolet truck complete with tool boxes and tools as well as tampers and breakers. This complete utility unit has proved its value many times over in emergency work as well as its convenience in hauling all equipment for ordinary pneumatic work on one truck with the tools all in place and locked in for safety. In addition there are one Ingersoll-Rand

(*Concluded on next page*)

Maintenance Roller Easily Transported

The Ferguson maintenance roller, made by the Shovel Supply Co., 1300 McKinney Ave., Dallas, Texas, was designed for use by state and county highway departments and contractors for maintenance, patching and small rolling jobs. Such work requires not only a small road roller which is easily maneuvered but also one which is easily transported from job to job.

This new roller is equipped with two pneumatic-tired wheels which can be lowered quickly and easily by a screw-jack arrangement, raising the roller off the ground. A specially designed tongue is then inserted, one pin dropped into place, and the roller is ready to trail. Upon arriving at the job, the process is reversed and the roller is ready for work. The operator rides and steers the roller, as with the conventional type, thus making for his safety as well as providing complete visibility in all directions.

The large roll is 32 inches in diameter and provides 181 pounds per linear inch of roll. The small or steering roll is composed of two drums running on a single high-carbon shaft and carried in an oscillating yoke so that both sections of this steering roll are always on the ground, regardless of the position of the large roll. Both large and small rolls are equipped with front and rear self-righting and self-adjusting scrapers. Both rolls are also equipped with mats which are kept wet from a large tank located in the hood of the roller.

Power is provided by a Wisconsin 3½ x 4-inch single-cylinder 6-hp air-cooled gasoline engine, equipped with outside-type high-tension magneto, carburetor, and fuel tank. Power is transmitted through a standard automotive-type transmission, having two speeds forward and one reverse. From the transmission, the drive is through steel-cut sprockets and Link-Belt RC-80 roller chain. Both chain and sprockets are fully enclosed.

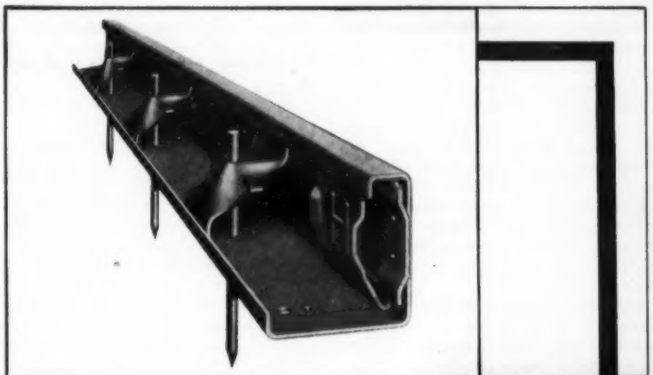
A new maintenance roller. The rubber-tired wheels are easily lowered for transporting from job to job.

Further information on this Ferguson maintenance roller may be secured by those interested direct from the manufacturer by mentioning this magazine.

Equipment Cleaning

A series of detailed performance records from highway and other contractors, outlining the improvements in performance and economies effected by the use of properly selected cleaners for motors and chassis, bodies, and other equipment, as contrasted with previous methods, has recently been issued by the Magnus Chemical Co., Garwood, N. J.

Copies of these case studies may be secured by contractors and state and county highway equipment engineers direct from the Magnus Chemical Co. by mentioning this item.



Heltzel Superior Heavy-Duty Road Forms have established a new low cost . . .

1. By building more miles of concrete slab.
2. By elimination of expensive upkeep and repairs.

. . . and because Heltzel forms are easier to set and strip — form setting costs are reduced to a minimum. Write for complete information and descriptive literature. Catalog 5-19.

• • •

Heltzel BUILDS IT BETTER

BINS, Portable and Stationary
CEMENT BINS, Portable and Stationary
CENTRAL MIXING PLANTS
BATCHERS (for batch trucks or truck mixers with automatic dial or beam scale)
BITUMINOUS PAVING FORMS
ROAD FORMS (with lip curb and integral curb attachments)
CURB FORMS
CURB AND GUTTER FORMS
SIDEWALK FORMS
SEWER AND TUNNEL FORMS
CONCRETE BUCKETS
SUBGRADE TESTERS
SUBGRADE PLANERS
TOOL BOXES
FINISHING TOOLS FOR CONCRETE ROADS

HELTZEL STEEL FORM & IRON CO. WARREN, OHIO - U. S. A.

Now..Easier DUMPING- 3½-T Mixer with SMALLER wheels - makes Quicker, Faster *Barrow Loading

This Lansing mixer is now equipped with 21" diameter pressed steel wheels, with 4 x 18" pneumatic tires (including inner tubes). Wheels have Timken Roller Bearings.

*Run your concrete Barrows right up under Mixing Drum (from either side).

. . . dump — and away goes the load in a hurry. Of course, your wheelbarrows should be Lansing built.

The 3½-T Mixer is sturdily built for fast trailing and quick mixing. Wheelbarrows can be easily loaded from either side. Why not write for literature and further information?

LANSING COMPANY
Lansing, Michigan

C. & E. M. Photo
Union County highway offices at the Road Department Yard near the center of the county.

Snow Removal Problem On Urban County Roads

(Continued from preceding page)

portable compressor mounted as a trailer; one ⅜-yard Bay City shovel and one ¾-yard Bay City shovel; one Austin 10-foot power grader; one Galion 10-foot power grader; one 15-ton Williams equipment trailer; four passenger cars for the road supervisors; two Ford delivery trucks with panel bodies; and one Chevrolet delivery truck with a panel body. All of the trucks are equipped with Good Roads pusher snow plows except as noted above, and one of the trucks has a special one-way plow which flares at the end, giving particularly effective removal. The smaller equipment includes six 150-gallon oil-burning tar kettles, one Hauck, one Aeroil and four Littlefords.

Organization and Financing

The Board of Freeholders of Union County consists of nine men, three of whom are elected each year for a term of three years. This Board elects a director from the Board who appoints all of the committees, one of which is the Committee on County Roads, comprised of five men. This committee acts as an Executive Board to advise and counsel with the County Supervisor of Roads. The caliber of the men on this Committee has been unusually high and it has proved an effective board for the economical operation of the County Road Department.

The money for the operation of the Department comes from three sources. First, there is the state motor vehicle license and gas tax, which returned $226,000 to the county in 1939. Then each county receives from the State the sum of $35,000 annually from motor vehicle licenses and gas taxes as a uniform return by the State. The first sum mentioned is returned to the county based on the area of the county, the miles of road and the population. The third source of funds is motor vehicle fines, amounting in 1939 to $30,728.

County Roads and Paving Methods

There are 142.5 miles of county roads in Union County made up of:

Concrete	49.8051 miles
Sheet asphalt on concrete base	46.9916 miles
Bituminous concrete	29.0240 miles
Stone block	0.0760 miles
Brick paving	0.4780 miles
Surface-treated macadam	3.8490 miles
Penetration macadam	12.2976 miles
Total	142.5213 miles

In the past three years all of the paving in Union County has been on the secondary roads. This work has consisted of a crushed-stone base 5 or 6 inches thick with a 2½-inch or 3-inch top of bituminous concrete or other hot or cold mix. The roads have not less than 22 feet paved area and measure 40 feet between the curb lines, or for the graded sections in open country. There were many street car lines in Union County and, as these have disappeared from the streets, the tracks were left in place and covered with a hot bituminous mix after the rails were carefully filled and tamped. The first of this type of work was done in 1924 on Westfield Avenue, in Rahway, using this method, and no difficulty has been experienced with any shifting or sinking of the pavement over the rails.

Snow Removal

A very well organized program has been developed in Union County for snow removal. The work is done only on county roads. The determination whether county equipment should be called out is based on reports from the Weather Bureau at the Newark, N. J., airport. If a storm shows that it is to continue, Herbert R. Bartlau, Equipment Superintendent in charge of this work, calls out all foremen and truck drivers, who pick up the helpers on regular predetermined routes on their way to the County Yard. The watchman at the County Yard has a list of calls which he makes on the telephone after instructions have been received from the Superintendent.

The trucks work in pairs over designated routes and call the county office every hour. If they are behind on their schedule, another pair of trucks is sent out to pass over the route being worked by the first pair. Two mechanics and two helpers with another truck are maintained in readiness to go out to repair snow-plow equipment which may fail during its strenuous tour of duty. In spite of careful overhauling during the summer and early autumn, snow-removal equipment does break down when in service, so that this emergency crew proves invaluable in maintaining constant service during storms. The routes which are worked up for the various trucks vary from 4 miles for the two trucks in hills up to 8 miles in level sections. After the storms, the trucks go out and push back the plowed snow as far as possible onto the shoulder or toward the gutters to make way for the next snowfall. All snow-removal expenses are paid from regular maintenance funds.

When ice forms on the road, cinders are used with a very small amount of calcium chloride to prevent the skidding of motor vehicles. The cinders are both hand-cast and spread with the usual rotary spreaders behind county trucks.

Personnel

The construction and maintenance of roads in Union County is under the direction of Herman Kling, County Supervisor of Roads, who has held this office for 21 years under a constantly changing Committee on County Roads. J. C. Tomasulo is Chief Clerk and has been with the county 20 years. Herbert R. Bartlau is Superintendent of Equipment.

We shall appreciate your mentioning CONTRACTORS AND ENGINEERS MONTHLY *when you write to advertisers.*

COMPACT—POWERFUL—SAFE
"For use where power is not practical or available"
Manufactured in 2, 5 and 15-Ton Sizes.
For capacity comparison, ½" cable used:
2-Ton "Lightweight" ..... 75 ft.
5-Ton "General Utility" ..... 250 ft.
15-Ton Triple-Geared "Special" .....1200 ft.
Patent instant gear change and positive internal brake that never fails, and will lock load.

Gear Ratios	Weight	Price, f.o.b. Seattle
2-Ton 4, & 22 to 1	60 lb.	$ 50
5-Ton 4, & 24 to 1	110 lb.	$ 75
15-Ton 4, 19 & 109 to 1	680 lb.	$250

BEEBE BROS.
2724 6th Ave., So., SEATTLE, WASH.
Warehouse stocks for dealers' Supply: Seattle—Chicago—Brooklyn—Houston. Complete Literature and List of Dealers in Principal U. S. Cities and Foreign Countries Gladly Mailed.

HOW TO BUY

THESE HELPFUL BOOKS ARE YOURS . . . FOR THE ASKING!

Whether you're in the market for a husky 5S Mixer, a big-capacity self-priming pump or for any other standard size mixer or pump, here's a group of books which will give you full details and complete design data on the size in which you are interested. Whether you buy one mixer or pump a year, or a dozen, these will act as valuable references to help you get more for your money.

SEND TODAY!

Get the "low down" on the Rex design and Rex quality that have "sold" themselves to thousands of experienced contractors like yourself!

Just ask for the books by number:

Rex Speed Prime Pumps . No. 365
Rex 3½S Mixers . . . . . No. 360
Rex 5S—7S Mixers . . . . No. 361
Rex 10S—14S Mixers . . No. 362
Rex 28S—56S Mixers . . No. 363

Address the Chain Belt Company, Dept. MP-8, 1666 W. Bruce St., Milwaukee, Wis.

BUY REX AND BE RIGHT!
MIXERS & PUMPS

PROOF

THAT BLACKHAWK HYDRAULIC JACKS
CONSERVE MAN-POWER
CUT DOWN TIME LOSSES

The pictures tell the story — proving how Blackhawk Hydraulic Jacks —

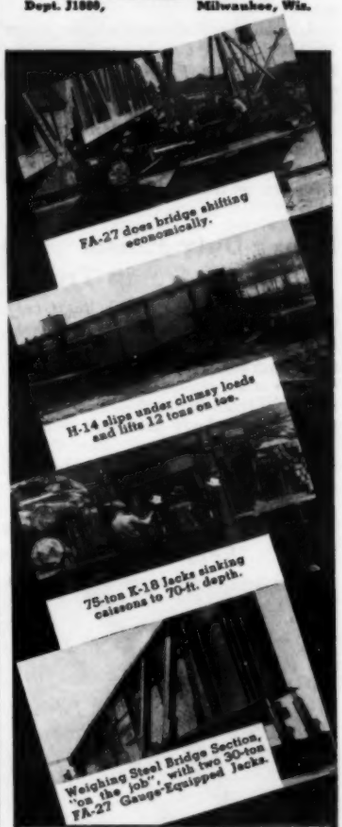
SAVE TIME — because they're handier to use — positioned and operated quicker than mechanical types.

SAVE MAN-POWER — because they deliver 94% operating efficiency, as compared to 12% to 30% for screw-type mechanical jacks. One man easily lifts full load—frees extra men for other jobs.

SAVE TROUBLE — No teeth to shear and suddenly drop load. Positive control to 1/1000th of inch in both raising or lowering.

SAVE EXPENSE — because they pack more power per dollar than any other type — often pay for themselves on first big job.

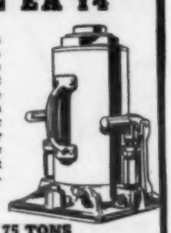
A Product of
BLACKHAWK MFG. CO.
Dept. J1600, Milwaukee, Wis.


FA-27 does bridge shifting economically.
H-14 slips under clumsy loads and lifts 12 tons on toe.
75-ton K-18 Jacks sinking caissons to 70-ft. depth.
Weighing Steel Bridge Section, "on the job", with two 30-ton FA-27 Gauge-Equipped Jacks.

20-TON EA 14

Built to "take it" on toughest construction jobs. Can also operate horizontally — a great advantage in close quarters. Has both speed and power pump. Weighs only 69½ lbs.— hydraulic lift 9½", total height 23½"—one-man operation.

$36.00 (East U.S.)



42 MODELS 1 TO 75 TONS

BLACKHAWK
World's Largest Manufacturer of Hydraulic JACKS

General traffic-line guards protect freshly painted traffic stripes.

Traffic Line Guards Protect Fresh Stripes

General traffic line guards, made by the General Road Equipment Co., Hanna Bldg., Cleveland, Ohio, are sturdily constructed metal units which span a freshly painted traffic stripe, to protect the paint from smearing by passing traffic. They are so constructed as to remain snug to the pavement and are easily handled.

These guards consist of a steel base section, a simple flat spring for controlling the flag staff in position, a steel flag staff, a slip collar for holding the flag at any mast, a red cloth flag, and a removable staff cap for easy handling and convenience in renewing the flag. The design of the base section provides for nesting the guards when they are not in service and makes it possible for the men to place them and take them out of service in a speedy and orderly manner.

According to the manufacturer, about 15,000 of these guards are in service, some for as long as 5 years, by state and county highway departments. Further information on General traffic guards is contained in an illustrated bulletin, copies of which may be secured direct from the manufacturer by mentioning this item, or from this magazine.

Heavy-Duty Hoists For Dump Trucks

The new Model GH-60 heavy-duty hoist, made by the Galion Allsteel Body Co., Galion, Ohio, is a powerful underbody hydraulic hoist which the manufacturer states occupies no more mounting space between the chassis frame and bottom of the body than that occupied by much lighter hoists. This 10-inch hoist permits a low and favorable loading height, and at the same time has all hoist parts above the chassis frame.

The general design of the GH-60 is the same as that of other Galion heavy-duty units, including the heavy patented equalizing lift arms. Especially designed extra-heavy rear hinge-pivots add to the ruggedness and service life of the hoist. Every bearing point has ¼-inch bronze bushings with oiler provisions, the piston rod is a specially selected steel rod of 3-inch diameter, the cylinder is bored and then honed to provide perfect fitting and functioning of the piston and rings within the cylinder. This hoist is rated in capacities of 13 to 22 tons, and operates at a maximum oil pressure of 70 pounds per ton of payload.

Copies of a new bulletin on the Galion Model GH-60 heavy-duty hydraulic hoist may be secured by those interested direct from the manufacturer by mentioning this item.

New Swivel-Type Roadside Marker

The Fireball swivel-type roadside marker, made by the National Color-type Co., Bellevue, Ky., is designed to provide full reflection from both sides of the road and in either direction, regardless of the degree of curve or angle of the road.

A round steel rod, securely fastened to the top of the post and equipped for mounting the reflector marker on each side as a distinct and individual unit, permits either or both reflecting faces to be placed at just the proper angle to meet any requirement. Tamper-proof hexagon keyed locks fasten the markers to the post.

The three reflecting units are Myria-aspherical lenses, each 1⅝ inches in diameter and integral in construction. Light is reflected in uniform and powerful brilliance from the whole of the exposed lens surface. The smooth, highly polished reflector is embedded in the lens structure, and the manufacturer states that tarnishing or corrosion is impossible. The lenses are so mounted that any one or all three may be changed or replaced without removing the marker units from the post. All metal parts are rust-proof and finished with durable baked enamel, and the housing is of stainless steel.

Further information on Fireball swivel-type roadside markers is contained in literature which state and county highway engineers may secure direct from the manufacturer by mentioning this magazine.

New District Managers For Chain Belt Offices

The Chain Belt Co. of Milwaukee, Wis., has announced the appointment of two new district managers. G. B. Flanigan has become New York District Manager, succeeding the late W. H. Quinn. Mr. Flanigan has been with the company since 1925, having served in both manufacturing and sales capacities. In 1928 he became a member of the New York District sales force, and in 1937 was appointed Chicago District Sales Manager.

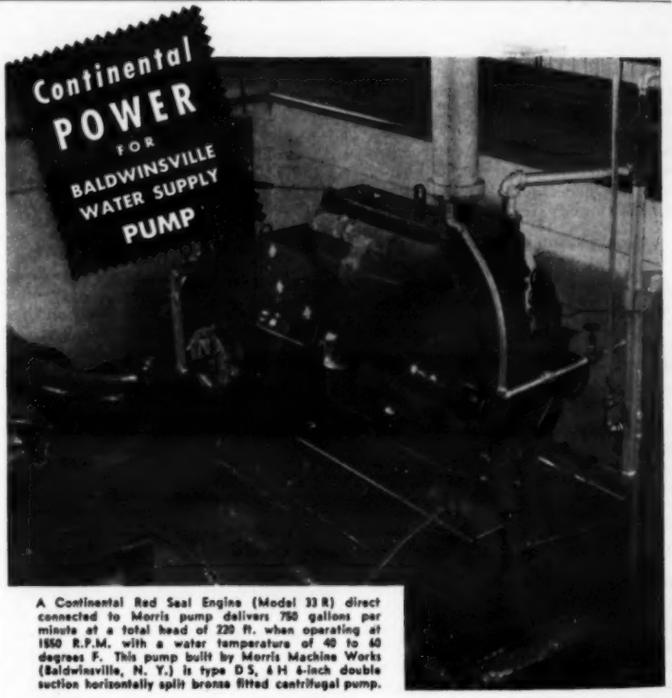
R. T. Steindorf, who has been with the company since 1924 in both the engineering and sales departments, has been appointed District Manager of the Chicago District Office.

NEW WAY to Work Faster

Operate electric tools with a Homelite Portable Generator. Complete unit including built-in gasoline engine is easily portable—only 62 pounds complete. Saves time. Eliminates electric installation charges. Furnishes plenty of power—1800 watts, 120 volts—enough for several tools or floodlights for night work. Rugged, very practical and low in cost. Send for bulletin.

Homelite Corporation

1068 Riverdale Ave., Port Chester, N.Y.



A Continental Red Seal Engine (Model 33 R) direct connected to Morris pump delivers 750 gallons per minute at a total head of 220 ft. when operating at 1550 R.P.M. with a water temperature of 40 to 60 degrees F. This pump built by Morris Machine Works (Baldwinsville, N. Y.) is type D S, 6 H 6-inch double suction horizontally split bronze fitted centrifugal pump.

Everytime

Continental Red Seal Power is the Preferred Equipment

Because thrifty operators have learned Continental Red Seal Engines are built to deliver full rated horsepower under constant operation. The reason is no mystery. Red Seal Engines can "take punishment" because they are designed and built to "take it," day after day and year after year.

Individual porting (an exclusive Continental feature) which balances power, is only one of many reasons for Continental superiority. Learn all the reasons before you buy power and if you have all the facts and consider economy, smooth performance, and dependability, you will undoubtedly specify Red Seal.

21 RED SEAL SIZES

Continental Motors Corporation
MUSKEGON, MICHIGAN

SELF-ALIGNING and SELF-FASTENING

EXPANSION JOINT

Assemblies for Concrete Paving

1. The Trusses support any size or kind of joint filler in rigid, vertical position.
2. Removable Filler Shield held to line and grade by trusses.
3. Two flat continuous parallel supports equalize the subgrade contour and prevent settlement.
4. Four continuous parallel supports grip the subgrade and prevent any movement. No danger of displacement during the placing and working of concrete.
5. Trusses with narrow horizontal surfaces eliminate the hazards of air pockets and planes of weakness.
6. Uniform and accurately gauged socket clearance.
7. No fastenings and a minimum of socket friction allow each side of assembly to move with new shrinking concrete—this prevents checking of concrete.

- Rigidly welded assembly assures the necessary alignment and levels of all trusses and filler.
- Trusses tested to transmit 12,000-lb. wheel loads in either direction.
- Installing an 11-foot assembly requires less than two minutes for one man.

THE W. S. GODWIN CO., Baltimore, Md.

Excavating for the runways at the Rochester Airport with an A-C LO tractor and Gar Wood scraper.

Airport Modernized At Rochester, Minn.

(*Continued from page 2*)

pond, and the contract for this phase of the work was awarded to B. S. Andrus of South St. Paul. Bernie Andrus' contract included 14 miles of vitrified-clay sewer tile and drain tile laid throughout the airport and under the runways. The new tile drain leading into the sewer system will care for sub-soil moisture and insures adequate drainage at all times. Also included in the Andrus contract, which was completed early last autumn, were a number of man-holes and catch-basins.

This contractor used a Bay City Model-42 ¾-yard dragline for excavation and an International TD-40 tractor with a Bucyrus-Erie bulldozer for backfilling. Other equipment included a Jaeger 7-S mixer, a Jaeger 4-inch pump, and three Ford V-8 trucks.

Grading the Airport

Leon Joyce of Rochester, a well-known Minnesota highway contractor, was awarded the contract for leveling the field and grading for the new runways. Although the four new runways have a combined length of less than 3 miles, the total excavation and grading exceeded 400,000 cubic yards.

Joyce set up a camp less than a mile from the job and work was started about the middle of last July, with two Northwest ¾-yard draglines moving an average of 1,000 yards a day. Working with an Adams 48-inch elevating grader, three Allis-Chalmers LO tractors, a Caterpillar Forty with a Baker bulldozer, a Sixty with a sheepsfoot roller, an RD7 with an Adams blade, and an RD8 with a LaPlant-Choate scraper, two Gar Wood 12-yard scrapers, one LeTourneau and one Continental scraper, an Austin-Western 99 patrol grader and eighteen Ford V-8 trucks, Leon Joyce moved an average of 5,000 yards a day while excavating for the runways.

On portions of the Joyce contract, the equipment was worked 24 hours a day, in three 8-hour shifts.

Preparing Rock for Runway Base

When the grading had been completed, the four runway locations were given a rolled rock base of crushed limestone. Halvorsen Bros., another well-known Rochester construction firm, produced about 100,000 tons of crushed rock at its quarry about 4 miles from the airport.

This contractor started operations on the contract about the middle of August, opening the quarry with one of the biggest dynamite detonations ever discharged in the Rochester area, the first shot being a 6-ton blast. As quarry operations proceeded, smaller blasts were used but before the work was finished the first shot was duplicated with another 6-ton blast. Altogether about 25 tons of Atlas dynamite was required for blasting at the Halvorsen quarry. The contractor used a Bucyrus-Armstrong well drill for the 6-inch 65-foot blast holes, as well as a Gardner-Denver 360-cubic foot compressor with four Gardner-Denver S-55 jackhammers.

Two Speeder ¾-yard shovels loaded to two International 3-ton trucks which hauled the rock to the Cedar Rapids super-tandem straight-line crushing plant, equipped with a 10 x 36 jaw crusher with 30 x 18-inch rolls and a 15 x 36 rock feeder, and powered by a Caterpillar 130-hp diesel and an 88-hp diesel unit. This outfit maintained a daily production of between 1,400 and 1,500 tons, working in two 10-hour shifts.

Twelve Ford V-8 trucks hauled the crushed rock to the airport where it was spread on the graded runways, bladed, rolled and compacted. The rolled rock provides the stabilized sub-base for the asphalt surfacing on the runways.

Paving the Runways

Last spring the program entered its final phase when the Fergus Construction Co. of St. Paul started laying the asphalt surface on the stabilized runways. The base course was completed last October and weathered a severe Minnesota winter without any signs of break-up.

Fergus used a 3,000-pound batch Madsen asphalt plant, with ground drier and Vortex dust collector and equipped with two Bros 39-hp boilers, to prepare the 26,000 tons of dense-graded aggregate plant mix for the project. The plant was served by an American Model 350 crane with a ½-yard clamshell.

The mix was hauled in four Diamond T motor trucks from the plant, located at the edge of the airport, to an Adnun paver and then laid by that machine. A 7 and a 10-ton Austin-Western Roll-a-Plane rolled the mix which was then sealed. About 70,000 gallons of RC2, furnished by the Standard Oil Co. of Indiana, was applied by an Etnyre distributor. Seal coat sand was then spread by a Burch spreader and the surface dragged with a broom drag behind a truck.

Production at the plant averaged from 90 to 100 tons of mix an hour, and about 100 pounds per square yard was used for both the base course and the surfacing.

Other Phases of Work

A lighting system designed to meet all contingencies has been installed by Foster & Mrachek of Rochester. With the completion of the wide paved runways, and the installation of floodlights and border lights, the Rochester airport will rank foremost in safety precautionary measures.

In furnishing its field with the best facilities available, the Rochester Airport Co. is determined that the field may be used at any time in any season. Accordingly, a complete snow-removal program has been mapped out, calling for removal of the snow as soon as it falls. Less swift and streamlined than the planes for which they will make way, but fully as efficient and speedy in their allotted work are the Snogo and a Caterpillar Sixty with V-plow which will snort from the hangars and plunge down the runways when Minnesota's first snow of next winter falls.

Personnel

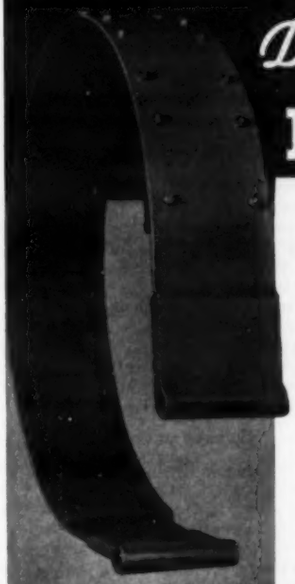
Don Swenson is Manager of the Rochester Airport Co. For the various contractors on the project, George Sager and Art Conaty were in charge of grading for Leon Joyce; Art Knutson was Superintendent for the Fergus Construction Co. on paving; while Bernie Andrus and P. B. and L. Halvorsen supervised their own contracts. J. R. Hoffman was Construction Engineer for Ellerbe & Co., Consulting Engineers.

Nova Scotia Builds Roads With Salt-Stabilized Bases

In 1934 there were only 28 miles of paved highways in Nova Scotia. At that time, in order to attract tourist traffic, a 5-year plan of road improvement was inaugurated and by November 30, 1939, nearly 900 miles of highway had been paved and thousands of miles of other roads improved. According to a report from the U. S. Bureau of Foreign and Domestic Commerce, the total mileage of all roads was 14,983, of which 857 miles were paved, 5,229 miles graded and gravel-surfaced, 3,626 miles graded only, and 5,271 miles not improved. All of the paved roads have some form of bituminous surface.

Approximately 175 miles of the newly paved highways have a salt-stabilized base. It is reported that 30 tons of salt was used for each mile of road, irrespective of the nature of the subgrade. The salt acts as an anti-freeze under the pavement, as well as stabilizing the subgrade.

GATKE BRAKE LINING
Does the Job RIGHT



For every brake or clutch requirement there is a GATKE Friction Material that does the job as it should be done.

Developed through more than a quarter century of contact with operators' service requirements, GATKE Materials afford —(1) Smooth operation with easy handling that reduces wear and tear on equipment, (2) Long wear that keeps equipment running without tie-ups for adjustments.

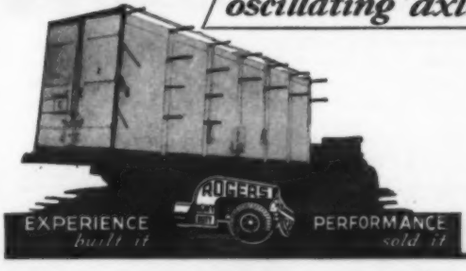
Write for data on the GATKE Asbestos Friction Product that will do your job as it should be done.

GATKE CORPORATION
224 N. La Salle St. Chicago

Carey Elastite EXPANSION JOINT
Standard in Concrete Construction for 25 Years
ECONOMICAL and EFFICIENT
Asphalt Joint · Rubber Joint
Non-Extruding Expansion Joint
Plate-Dowel Expansion Joint
Sub-grade Felt
THE PHILIP CAREY COMPANY
Dependable Products Since 1873
LOCKLAND CINCINNATI OHIO

HAULING of THIS Brick-lined OVEN Possible only with oscillating axle type of trailer

wrote ROGER SHERMAN of Hartford, Conn.



He of course referred to his Rogers "8 WHEEL REAR TRAILER."

In it he had unequalled oscillation laterally and longitudinally, extra wide tread to distribute the load over a wide area and a liberal amount of rubber, all of which combine to assure the least possible vertical movement of the trailer bed with minimum vibration, easier traction and longer life of tires.

EXPERIENCE built it PERFORMANCE sold it

ROGERS BROS. CORP., 108 Orchard St., Albion, Pa.

The completed elliptical sewer tunnel, showing the air line at the left of the tracks and above on the left the cables for the light and telephone lines. This is part of an extensive sewerage program in Fort Wayne, Ind.

Erecting Steel in Sewer, Mucking and Concreting

(*Continued from page 9*)

four electric lines were carried well above the heads of workers. There was a single line for light, and a 3-phase line for power, and also at the top the telephone line. Beneath these at invert elevation the high and low-pressure air lines and the pump discharge line were run. The invert for the entire length of the job, whether poured or ahead of the concrete, was well-planked for easy walking of the men in the tunnel.

An 8-inch steel pipe carried out through one of the manholes from the street served as the intake for the blower which supplied fresh air to the heading or at a maximum distance of about 100 feet. The American blower was set on the north side of the tunnel delivering the air through a canvas pipe 12 inches in diameter furnished by Bemis Bag Co. The intake pipe extended about 7 feet above street elevation and was topped with a double cover of ¼-inch wire mesh to protect against insects and other undesirable matter entering.

Mining and Steel Erection

The mining at the face was done with Ingersoll-Rand clay spades of which four were in constant use with a spare ready at hand. The face was worked in one bench at mid height and then two drifts to permit the erection of the side steel. The crew at the face consisted of four miners and six muckers with the foreman. The miners alternately used the clay spades and set the Armco liner plates with first seven and then eight to a ring, breaking the joints. The plates have two corrugations running longitudinally and 1¼ inches deep and with a 2-inch flange. The 12-gage plates are 49½ inches long x 18 inches wide. They were erected with four bolts in each flange and five staggered at the ends where they lapped 4 inches. Where there was a run of sand, straw was used to pack behind the liner plates to stop the flow. Where the tunnel was slightly off line, wood blocks were used between the flanges of the plates to give the right amount of forward movement to one side or the other to correct the line. Grade was watched very carefully also at the crown. All bolts were tightened by hand with 15-inch wrenches.

Mucking from Face to Spoil

The five muckers shoveled the rather friable material to the 1½-yard dump cars and pushed the single cars from the face back to the last switch, a maximum distance of 200 feet. Two men at a time did the pushing and alternated at this work and loading. The track at the heading was raised slightly to give the loaded car a slight advantage when pushing the load back.

At the shaft the car bodies were picked up by the two men at the bottom of the hole attaching the two hooks at the ends of a spanner, made of two 5-inch channels, to the ends of the body and the car body was hoisted to the top with a ¾-inch cable on a Koehring crane blocked close to the shaft. The 50-foot boom of the crane and the swing permitted easy handling of the car bodies to the top of the spoil bin where one man handled the dumping of the muck into the triangular hoppers to await the trucks which hauled the material away for fill in city parks and in a nearby sub-division. One man at the top, ground level, did the signaling to the crane operator through bell signals with a red light cut into the push button circuit so that there was a visual signal as well as a bell in case of unusual noise. All signals were given from the bottom for the upward trip and repeated from the top before hoisting began and the reverse was true for lowering.

When the men at the bottom of the shaft were waiting for the arrival of a train of muck and there was no use for the spanner and hooks, the latter were swung back out of the way and slipped through wire loops to protect the locomotive driver and others from possible injury from the swinging hooks.

Concreting and Grouting

As soon as the invert was fine graded and the steel set, 3-inch I beams were set along each side and then 6-inch bridge beams bolted to the steel liner plates to support the track at the correct elevation for the traveler and collapsible Blaw-Knox steel forms. Then the invert was poured directly from the dump cars and finished and allowed to set before the bridge beams were removed.

The concrete was furnished by Old Fort Supply Co., a local ready-mixed concrete producer, and delivered in 2 and 3-cubic yard Rex truck mixers. As mentioned, the concrete was first delivered through a pipe in the shaft and then, as the length of haul in the tunnel increased, through 10-inch pipes run down through manhole openings in a similar manner.

The steel forms were made in 5-foot sections and carried on a traveler running on the industrial railway track sup-

(*Concluded on next page*)

A New Belt Parkway "All Around the Town"

(*Photos on page 4*)

The new Belt Parkway in New York City which was opened on June 29 extends through Brooklyn and Queens, connecting with the marginal arteries of the Bronx, Westchester and Manhattan, and forms a link in the plan for a highway completely around New York City. This 34.9-mile Parkway combines the most advanced knowledge of engineering, planting and recreation, providing separated traffic, entrances at strategic points with accelerating and decelerating lanes, and incidental parks, playgrounds, walks and bicycle paths along its borders.

In the design of the Belt Parkway there are forty-seven bridges eliminating street grade crossings; five bridges eliminating railroad grade crossings, including a 2,740-foot viaduct over the BMT tracks and yards at Coney Island; six bridges carrying the Parkway over waterways; and six bridges to carry pedestrians over the parkway. During its construction, 11,800,000 cubic yards of hydraulic fill was pumped; 4,800,000 cubic yards of dry fill was moved; and 1,500,000 square yards of pavement laid. Materials used included 530,000 cubic yards of concrete, 11,500 cubic yards of masonry, 400,000 linear feet of piles, 320,000 tons of steel, and some 9,000 men were employed. A hundred contracts were let for this work.

The project was financed by a PWA grant of $12,000,000 to supplement the $16,000,000 appropriated by the New York City Board of Estimate. An additional appropriation of $1,900,000 was made by the City for lighting and for the construction of a sea wall, making the total cost $29,000,000.

Keep up-to-date. Read the 43 items on new equipment and literature in this issue and write for further details.

How STEVENS BATCHERS Reduce Costs for Contractors Everywhere . . .

CAPACITY 7 SACKS

DELIVERS BULK CEMENT

IT'S ONLY A ONE-MAN JOB

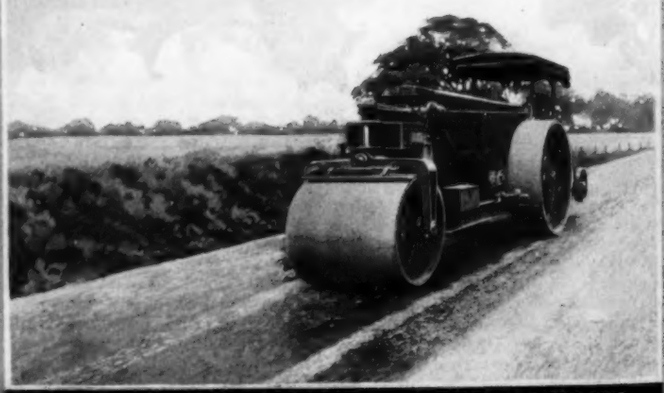
EASY to Use in Close Quarters

One man with a Stevens Batcher can deliver a 700-pound load of bulk cement from the car to the working platform. Easy to push and maneuver . . . easy to dump with complete discharge. It will reduce your labor costs for years to come.

Write Today FOR DESCRIPTIVE FOLDER & PRICES

THE STEVENS METAL PRODUCTS CO.
NILES, OHIO

BUFFALO-SPRINGFIELD



3-AXLE TANDEM ROLLERS TANDEM ROLLERS
3-WHEEL ROLLERS TRENCH ROLLERS

THE BUFFALO-SPRINGFIELD ROLLER CO.
SPRINGFIELD, OHIO

BETTER excavating BUCKETS are being built . . .

UTILIZING the proven principle of the round-nosed spade, Owen Type DX Round Nosed Bucket lip centers penetrate deeply with minimum resistance and continue to carve their way into the hardest materials, assuring a capacity load with each grab.

Rounded shell corners facilitate easy entrance of material and assure a rapid dumping action of even the stickiest clay.

The OWEN BUCKET CO. 4630 BREAKWATER AVE. CLEVELAND, OHIO BRANCHES: New York, Philadelphia, Chicago, Berkeley, Calif.

and OWEN is BUILDING them

Change of Address

(Mail to Contractors and Engineers Monthly, 470 4th Ave., New York, *today*)

From_____
(Old address)

_____

_____

To_____
(New address)

_____

_____

Name_____

C. & E. M. Photo
George Wood, Superintendent for the contractors on the Rudisill intercepting sewer, Fort Wayne, Ind.

New Fort Wayne Sewer Driven Through Clay

(Continued from preceding page)

ported by the bridge beams. The traveler was 20 feet long and carried 30 feet of forms at one time. The forms were hinged at the top and about 3 feet from the bottom, permitting raising conveniently by six mechanical jacks running from the frame of the traveler at a slight rise to about mid height of the forms. The bottom or wing sections were blocked from the traveler during pouring.

The concrete for the arch section was brought in by the dump cars and delivered to the small hopper at the bottom of an 18-inch belt 20 feet long which carried the concrete to the pneumatic delivery hopper of the Pressweld concrete placer. This was used at a maximum distance of 40 feet from the forms.

The traveler was removed immediately after the forms were set, and the forms were stripped in 48 hours after the pour. The concrete used in this job was designed for 3,500-pound strength at 28 days and developed uniformly an average of 4,500 pounds throughout the work.

After each section was poured grout holes were drilled every 8 feet in the crown of the tunnel and 1 to 1 grout forced into the 1½-inch holes with a Union Iron Works grouting machine at 100-pounds pressure. As soon as the grout showed at the next hole the grouting was stopped. Very little grout was used usually in each hole, except where sand veins were met and then there was a really large amount required to seal off the vein.

Servicing the Job

Every job of this type requires a considerable amount of equipment that is not directly connected with the action of the job but which is most important in making the job run smoothly and efficiently. On this particular job the use of a portable air receiver of 100-cubic foot capacity saved considerably in the effective operation of the pneumatic concrete placer. It was mounted on a single industrial railway truck and moved along as required to maintain the pressure close to the placer when large volumes of air were needed quickly.

At the top of the shaft and just to one side away from the crane, but where it could be reached easily by the crane, was a section of track with two spurs leading into the battery charging house. A couple of car trucks were used to move the batteries into the house where they were recharged by Hertner battery chargers and prepared for prompt service on the Whitcomb locomotives. Exide batteries were used throughout this contract. During good weather in summer one battery charger was operated out doors.

At the end of the compressor house mentioned below a section was partitioned off for the wood working shop. It was equipped with a gas-engine-driven band saw and circular saw for the intricate work of assembling the forms for the manholes which entered the horseshoe section sewer.

The compressor house was a galvanized iron house 22 x 55 feet, including the wood working section, and contained the five air compressors for the job. They were two low-pressure Ingersoll-Rand compressors, two high-pressure units of the same manufacturer and one Chicago-Pneumatic high-pressure compressor. Each unit was powered with a 75-hp General Electric motor.

Shifts and Labor

A total of 40 men were employed per shift, on this contract, working three 8-hour shifts as follows: 8 a.m. to 4 p.m.; 4 p.m. to 12 midnight; and midnight to 8 a.m. The job was run every day except Sundays and holidays when the PWA requires shutting down.

Personnel

The intercepting sewer and sewage treatment project of which this contract was a part was designed for the City of Fort Wayne, Ind., by Charles W. Cole, Consulting Engineer, South Bend, Ind., for whom O. M. Leonard was Sanitary Engineer and W. H. Gartner, Engineer of Construction. The contract was awarded on a unit price basis to Bass Engineering & Construction Co. of Detroit, Mich., and Frank J. Knight, Inc., also of Detroit, Mich. For the contractors, V. J. Peterson was the contractor's representative and office manager, and George Wood was Superintendent. This was built as a PWA project Indiana Docket 1081-F.

New Truscon Sales Mgrs.

W. V. Peters and C. B. McGehee have been appointed Managers of Sales in charge of the northern and southern areas, respectively, by the Truscon Steel Co. of Youngstown, Ohio, following the resignation of Grover J. Meyer, formerly General Manager of Sales.

Mr. Peters was formerly Assistant General Manager of Sales, and before that was District Sales Manager in Cleveland and Manager of Sales of the Steel Window Division in Youngstown. Until his recent appointment, Mr. McGehee was Manager of Sales of the Highway Products Division, and District Sales Manager in Atlanta and Dallas.

New Circular Saw

A new model of a pneumatic circular saw, known as the Model P-120, has recently been announced by the Mall Tool Co., 7743 So. Chicago Ave., Chicago, Ill. This 12-inch saw has a free speed of 1,400 rpm, a cutting capacity of 4⅝ inches, and weighs 29 pounds.

Among its features are adjustment for depth of cut; a swivel base for cutting any angle up to 45 degrees; a blower operated by the exhaust air of the motor to keep the cutting line and observation glass clear; and the Mall patented telescopic safety guard which gives complete protection to the operator at all times.

A bulletin containing further information on this Mall P-120 circular saw may be secured from the manufacturer.

The new Mall pneumatic circular saw.

LeTourneau Crane Handles Thirty 6-Ton Cement Tanks a Shift at Batching Plant

To make your heavy materials handling jobs easy . . . and profitable . . . take a tip from long-time LeTourneau fleet user, Roy L. Houck. He keeps a LeTourneau Crane for quick tractor hookup, to handle jobs like the one shown above.

As trucks bring 6-ton tanks of bulk cement to his highway paving job, near Albany, Oregon, the 30-foot Crane unloads them . . . sets them aside, ready for use at the batching plant. . . . Then, picks up the tanks and dumps into the plant as needed. One man—the "Caterpillar" D8 operator—handles every Crane operation by means of the LeTourneau double-drum Power Control Unit . . . handles thirty of these 6-ton tanks a day, and loads the "empties" back onto the trucks.

You can make your difficult jobs easy and cheap, too. No other crane on the market offers you such operating ease . . . maneuverability . . . or precision control. Safely handles loads of 4 to 10 tons, depending on tractor size. Can be connected or detached in 15 to 20 minutes, leaving your tractor available for other work. See your LeTourneau and "Caterpillar" dealer for a demonstration NOW!

LETOURNEAU
PEORIA, ILL. STOCKTON, CALIF.

ASPHALT MIXING PLANTS

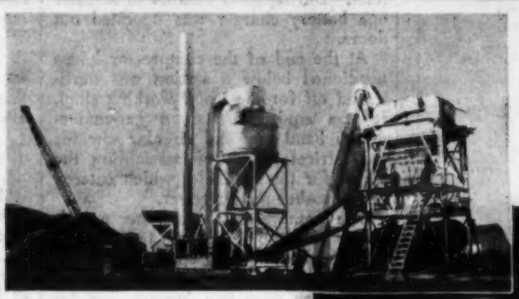
H & B—Stationary and portable mixing plants are designed and built to turn out maximum tonnage at minimum cost. These plants are available with batch capacities of 350 to 8000 pounds and are engineered to meet your individual requirements. Manufacturing is centralized in our own shops and each plant is completely assembled in our yard before shipment is made.

Descriptive literature sent upon request.

HETHERINGTON & BERNER INC.
ENGINEERS AND MANUFACTURERS
701-745 KENTUCKY AVENUE • INDIANAPOLIS, INDIANA

Contractors and Engineers Monthly

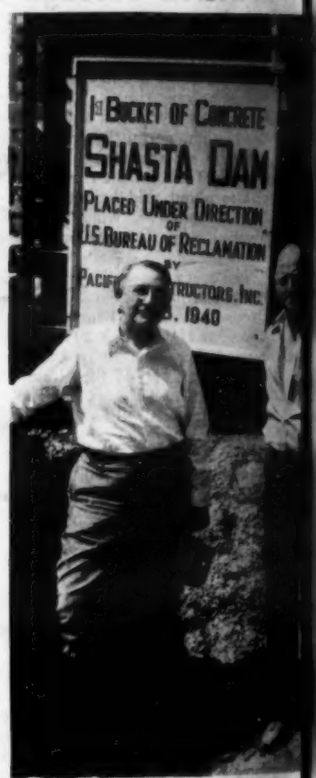
Scenes at the Highway Transportation Exhibit at the 1940 New York World's Fair, where the general public takes advantage of the opportunity to learn more about some of the equipment used in building our roads, as well as on the completed highways. See page 16.



Above, the 3,000-pound-batch Madsen asphalt plant which supplied the dense-graded asphaltic concrete for the runways at the Rochester, Minnesota, airport built by the Fergus Construction Co. of St. Paul, Minn. An interesting feature of this airport job was the fact that all of the work was done by contract and paid for by private funds.

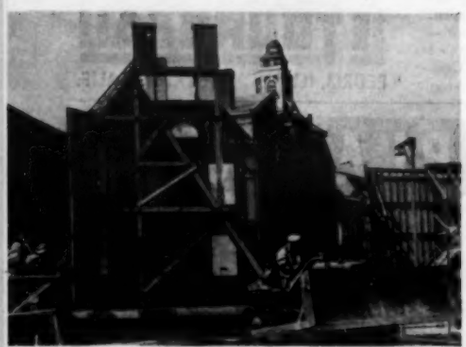
Below, a view of Malverna Bros. quarry where aggregate for the runways of the Rochester airport was prepared. In the background is the Cedar Rapids crusher and in the foreground, a Speeder ¾-yard shovel. See page 1.

A Telsmith 10-B gyratory and a 32-B reduction crusher with the necessary screening and conveying equipment used on road construction in northern Mexico.



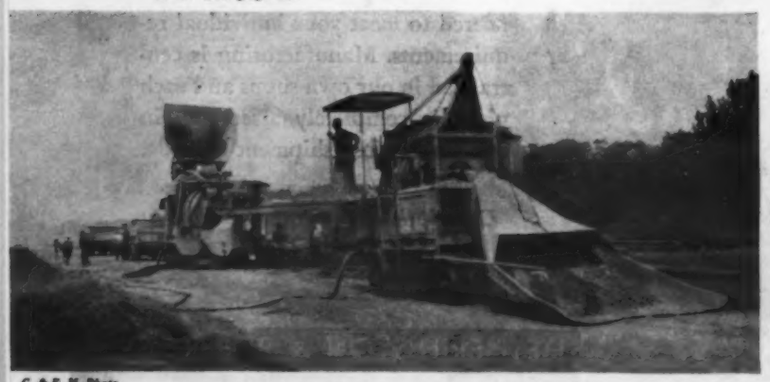
Bureau of Reclamation Photo

Standing on the first concrete poured the base of Shasta Dam are Ralph Le (at left), Construction Engineer for Bureau, and Frank T. Crowe, Su tendent for Pacific Constructors,



That the construction industry is prepared to meet any emergency, national or otherwise, is evidenced by this International tractor's being pressed into service to move the world's largest revolving stage at the American Jubilee, popular musical show at the New York World's Fair. See page 20.

Union County, N.J., has resurfaced many of its roads, where street car lines have been abandoned, with hot bituminous mix. Here are before and after views. See page 1.



C. & E. M. Photo

Two pavers with a strike-off between poured the concrete on the Boutrager Construction Co. contract for 4 miles of concrete boulevard paving at Valparaiso, Ind. See page 7.

A new 423-foot viaduct carrying the relocation of U. S. 20 west of Dubuque, Iowa, after erection was completed by Jansen Construction Co. See page 12.